Atlantic States Marine Fisheries Commission

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Spud Woodward (ME), Chair *Joe Cimino (NJ), Vice-Chair* *Robert E. Beal, Executive Director*

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

MEMORANDUM

April 21, 2022

TO: Commissioners; Proxies; Atlantic Coastal Cooperative Statistics Program Coordinating Council; Atlantic Menhaden Management Board; Atlantic Striped Bass Management Board; Coastal Pelagics Management Board; Coastal Sharks Management Board; Executive Committee; Horseshoe Crab Management Board; ISFMP Policy Board; Law Enforcement Committee; Mid-Atlantic Fishery Management Council; Sciaenids Management Board: Shad and River Herring Management Board

FROM: Robert E. Beal REB
Executive Director

RE: ASMFC Spring Meeting: May 2-5, 2022 (TA 22-007)

The Atlantic States Marine Fisheries Commission's Spring Meeting will be held May 2-5, 2022 at **The Westin Crystal City** (Telephone: 703.486.1111), located at 1800 Richmond Highway, Arlington, VA. The room block is now closed; if you need assistance reserving a room, please contact Cindy Robertson at Crobertson@asmfc.org.

This will be a hybrid meeting (both in-person and remote) to allow for remote participation by Commissioners and interested stakeholders (meeting process details are provided later in this memo). The Law Enforcement Committee meeting will not be available remotely. Meeting materials are available on the Commission website at http://www.asmfc.org/home/2022-spring-meeting. Supplemental materials will be posted to the website on Wednesday, April 27, 2022.

The agenda is subject to change. The agenda reflects the current estimate of time required for scheduled Board meetings. The Commission may adjust this agenda in accordance with the actual duration of Board meetings. Interested parties should anticipate Boards starting earlier or later than indicated herein.

Board meeting proceedings will be broadcast daily via webinar beginning Monday, May 2 at 10 a.m. and continuing daily until the conclusion of the meeting (expected to be 12:30 p.m.) on Thursday, May 5. To register for the webinar, please go to https://attendee.gotowebinar.com/register/6673024452273516048 (Webinar ID: 243-937-907). If you are joining the webinar but will not be using voice over Internet protocol (VoIP), you can may also call in at +1 (562) 247-8422, access code 616-672-938. A PIN will be provided to you after joining the webinar; see webinar instructions for details on how to receive the PIN. For those who will not be joining the webinar but would like to listen in to the audio portion only, press the # key when asked for a PIN.

In terms of meeting process, Board chairs will ask both in-person and virtual Board members if they wish to speak. In-person members can simply raise their hands at the meeting without logging on to the webinar, while virtual members will raise their hands on the webinar. The Chair will work with staff to compile the list of speakers, balancing the flow of questions/comments between in-person and virtual attendees. The same process will be used for the public and interested stakeholders when the Board Chair provides an opportunity for public comment. Depending upon the number of commenters, the Board Chair will decide how to allocate the available time on the agenda (typically 10 minutes) to the number of people who want to speak.

Each day, the webinar will begin 15 minutes prior to the start of the first meeting so that people can troubleshoot any connectivity or audio issues they may encounter. If you are having issues with the webinar (connecting to or audio related issues), please contact Chris Jacobs at 703.842.0790.

We look forward to seeing you at the Spring Meeting. If the staff or I can provide any further assistance to you, please call us at 703.842.0740.

Enclosures: Final Agenda, Hotel Directions, TA 22-007, and Travel Reimbursement Guidelines

Atlantic States Marine Fisheries Commission

2022 Spring Meeting

May 2-5, 2022

Public Comment Guidelines

To provide a fair opportunity for public input, the ISFMP Policy Board has approved the following guidelines for use at management board meetings:

For issues that are not on the agenda, management boards will continue to provide opportunity to the public to bring matters of concern to the board's attention at the start of each board meeting. Board chairs will ask members of the public to raise their hands to let the chair know they would like to speak. Depending upon the number of commenters, the board chair will decide how to allocate the available time on the agenda (typically 10 minutes) to the number of people who want to speak.

For topics that are on the agenda, but have not gone out for public comment, board chairs will provide limited opportunity for comment, taking into account the time allotted on the agenda for the topic. Chairs will have flexibility in deciding how to allocate comment opportunities; this could include hearing one comment in favor and one in opposition until the chair is satisfied further comment will not provide additional insight to the board.

For agenda action items that have already gone out for public comment, it is the Policy Board's intent to end the occasional practice of allowing extensive and lengthy public comments. Currently, board chairs have the discretion to decide what public comment to allow in these circumstances.

In addition, the following timeline has been established for the **submission of written comment for issues for which the Commission has *NOT* established a specific public comment period** (i.e., in response to proposed management action).

1. Comments received three weeks prior to the start of a meeting week (April 11) have been included in the briefing materials.
2. Comments received by 5:00 PM on Tuesday, April 26th will be included in supplemental materials.
3. Comments received by 10:00 AM on Friday, April 29th will be distributed electronically to Commissioners/Board members prior to the meeting.

The submitted comments must clearly indicate the commenter's expectation from the ASMFC staff regarding distribution. As with other public comment, it will be accepted via mail and email.

Final Agenda

The agenda is subject to change. The agenda reflects the current estimate of time required for scheduled Board meetings. The Commission may adjust this agenda in accordance with the actual duration of Board meetings. Interested parties should anticipate Boards starting earlier or later than indicated herein.

Monday, May 2

10:00 a.m. – Noon **Atlantic Coastal Cooperative Statistics Program Coordinating Council**
Partners: ASMFC, Connecticut, Delaware, District of Columbia, Florida, Georgia, MAFMC, Maine, Maryland, Massachusetts, NEFMC, New Hampshire, New Jersey, New York, NMFS, North Carolina, Pennsylvania, PRFC, Rhode Island, SAFMC, South Carolina, USFWS, Virginia
Chair: Carmichael
Staff: White

1. Welcome/Call to Order *(J. Carmichael)*
2. Council Consent
   - Approval of Agenda
   - Approval of Proceedings from October 2021
3. Public Comment
4. Consider Funding Decision Document and FY2023 Request for Proposals *(J. Simpson)* **Action**
5. Committee Updates
   - 2022 Data Accountability Report – Completed
   - Status Update on 2023-2027 Atlantic Recreational Implementation Plan
   - Status Update on Methodology for Logbook Estimates of Catch and Effort with Dockside Validation
6. Program Updates
7. Other Business/Adjourn

Noon – 1:00 p.m. **Lunch Break**

1:00 – 2:00 p.m. **Coastal Pelagics Management Board**
Member States: Rhode Island, New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida
Other Members: NMFS, PRFC, SAFMC
Chair: Cimino
Other Participants: Giuliano, Hodge
Staff: Franke

1. Welcome/Call to Order *(J. Cimino)*
2. Board Consent
   - Approval of Agenda
   - Approval of Proceedings from October 2020
3. Public Comment
4. Consider Quota Block Timeframe for Cobia **Possible Final Action**
   - Technical Committee Report *(A. Giuliano)*
   - Consider Changes to the Three-Year Quota Block for Harvest Specifications for Cobia *(J. Cimino)*
5. Updates on Spanish Mackerel Stock Assessment Timeline and Federal Waters Management *(E. Franke)*
6. Elect Vice-Chair **Action**
7. Other Business/Adjourn

2:15 – 4:15 p.m. **Sciaenids Management Board**

Member States: New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida
Other Members: NMFS, PRFC
Chair: Batsavage
Other Participants: Franco, Giuliano, Paramore, Rickabaugh, Hodge, Ballenger, Schueller
Staff: Bauer

1. Welcome/Call to Order *(C. Batsavage)*
2. Board Consent
   - Approval of Agenda
   - Approval of Proceedings from August 2021
3. Public Comment
4. Consider Red Drum Simulation Assessment and Peer Review Report **Action**
   - Presentation of Red Drum Simulation Assessment Report *(J. Ballanger)*
   - Presentation of Peer Review Panel Report *(A. Schueller)*
5. Progress Update on Black Drum Benchmark Stock Assessment *(J. Kipp)*
6. Other Business/Adjourn

Tuesday, May 3

8:30 – 10:00 a.m. **Horseshoe Crab Management Board**

Member States: Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida
Other Members: NMFS, PRFC, USFWS
Chair: Clark
Other Participants: Ameral, Couch
Staff: Starks

1. Welcome/Call to Order *(J. Clark)*
2. Board Consent
   - Approval of Agenda
   - Approval of Proceedings from January 2022
3. Public Comment
4. Progress Update on Draft Addendum Vlll *(C. Starks)*
   - Review Recommendations on Options for Implementing the Adaptive Resource Management Framework Revision
   - Provide Guidance to the Plan Development Team
5. Update on PDT Review of Biomedical Mortality and Best Management Practices for Biomedical Collections *(C. Starks)*
6. Other Business/Adjourn

10:15 – 11:45 a.m. **Shad and River Herring Management Board**

Member States: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida
Other Members: DC, NMFS, PRFC, USFWS
Other Participants: Neilan, Warner
Chair: Fegley
Staff: Boyle

1. Welcome/Call to Order *(L. Fegley)*
2. Board Consent
   - Approval of Agenda
   - Approval of Proceedings from October 2021
3. Public Comment
4. Consider American Shad Habitat Plans/Updates *(B. Neilan)* **Action**
   - Connecticut River
   - Merrimack River
5. Consider American Shad and River Herring Sustainable Fishery Management Plan Updates *(B. Neilan)* **Action**
   - New York (River Herring)
   - Delaware River Basin Cooperative (American Shad)
6. Consider Technical Committee Report from Board Task on Prioritizing Systems for Shad Recovery and Developing Inventory of Available Data to Support Development of Fish Passage Criteria *(B. Neilan)*
7. Consider Fishery Management Plan Review and State Compliance for 2020 Fishing Year *(J. Boyle)* **Action**
8. Update on the 2023 River Herring Benchmark Stock Assessment
   - Discuss Stock Assessment Subcommittee Membership *(K. Drew)*
9. Review and Populate Advisory Panel Membership *(T. Berger)* **Action**
10. Other Business/Adjourn

11:45 a.m. – 12:45 p.m. **Lunch Break**

12:45 – 5:15 p.m. **Atlantic Menhaden Management Board**

Member States: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida
Other Members: NMFS, PRFC, USFWS
Chair: Bell
Other Participants: Newhard, Kersey
Staff: Boyle

1. Welcome/Call to Order *(M. Bell)*
2. Board Consent
   - Approval of Agenda
   - Approval of Proceedings from January 2022
3. Public Comment
4. 2021 Landings Data Update *(J. Boyle)*

5. Consider Draft Addendum I to Amendment 3 for Public Comment *(T. Kerns)* **Action**
   - Review 2020 Landings Proposal
6. Other Business/Adjourn

6:30 – 8:00 p.m. **2020 and 2021 Annual Awards of Excellence Reception**

Wednesday, May 4

8:00 – 10:00 a.m.
Breakfast will be available at 7:30 a.m.

Executive Committee
(A portion of this meeting will be a closed session for Committee members and Commissioners only)
Members: Abbott, Bell, Burgess, Cimino, Clark, Davis, Fegley, Gilmore, Keliher, Kuhn, McKiernan, McNamee, Miller, Patterson, Plumlee, Rawls, Woodward
Chair: Woodward
Staff: Leach

1. Welcome/Call to Order *(S. Woodward)*
2. Committee Consent
   - Approval of Agenda
   - Approval of Meeting Summary from January 2022
3. Public Comment
4. Review and Consider Approval of the Commission Budget for Fiscal Year 2023 *(L. Leach)* **Action**
5. Consider Changes to the Commission's Appeals Policy *(R. Beal)*
6. Discuss Use of *De Minimis* in Interstate Fishery Management Plans *(T. Kerns)*
7. Conduct the Executive Director's Performance Review **(Closed Session)**
8. Other Business/Adjourn

8:30 a.m. – 3:00 p.m.
1 hour lunch break Included

Law Enforcement Committee *(A portion of this meeting will be a closed session for the LEC Coordinator and Committee members only)*
Members: Aydelotte, Beal, Blanchard, Brown, Burrell, Couch, Gadomski, Hettenbach, Hodge, Hogan, Kersey, Moore, Moran, Noel, Pearce, Ray, Rogers, Seltzer, Snellbaker, Thomas, Walker, Williams
Chair: Snellbaker
Staff: Kerns

1. Call to Order/Roll Call of the LEC Representatives *(J. Snellbaker)*
2. Approval of Agenda
3. Public Comment
4. Introductions
5. Review Enforceability Guidelines and Consider Updates, as Needed
6. Review and Discuss ASMFC Species
   - Trackers in the American Lobster Fishery
   - Atlantic Herring: Update on Regulation Changes in Federal Waters
7. State Agency Reports
8. Elect Vice-Chair **Action**
9. Review and Discuss Ongoing Enforcement Activities **(Closed Session)**
10. Other Business/Adjourn

10:15 – 11:15 a.m. **Coastal Sharks Management Board**

Member States: Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida
Other Members: NMFS
Chair: Bell
Other Participants: Willey, Thomas, Brewster-Geisz
Staff: Colson Leaning

1. Welcome/Call to Order *(M. Bell)*
2. Committee Consent
   - Approval of Agenda
   - Approval of Proceedings from October 2021
3. Public Comment
4. Consider Zero Retention Limit/Closure of the Shortfin Mako Fishery **Final Action**
   - Overview of the NOAA Fisheries Proposed Rule *(K. Brewster-Geisz)*
5. Other Business/Adjourn

11:30 a.m. – 5:15 p.m. **Atlantic Striped Bass Management Board**

1 hour lunch break included

Member States: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina
Other Members: DC, NMFS, PRFC, USFWS
Chair: Gary
Other Participants: Hoffman, Blanchard
Staff: Franke

1. Welcome/Call to Order *(M. Gary)*
2. Board Consent
   - Approval of Agenda
   - Approval of Proceedings from January 2022
3. Public Comment
4. Draft Amendment 7 to the Interstate Fishery Management Plan for Final Approval **Final Action**
   - Review Options and Public Comment Summary *(E. Franke)*
   - Advisory Panel Report *(E. Franke)*
   - Law Enforcement Committee Report *(K. Blanchard)*
   - Consider Final Approval of Draft Amendment 7
5. Review 2022 Stock Assessment Update Projection Scenarios *(K. Drew)*
6. Consider Next Steps for Draft Addendum VII to Amendment 6 **Possible Action**
   - *Motion from October 2021: Move to defer until May 2022 consideration by the Atlantic Striped Bass Board of Draft Addendum VII to Amendment 6 to allow further development and review of the transfer options*
7. Review and Populate Advisory Panel Membership *(T. Berger)* **Action**
8. Elect Vice-Chair **Action**
9. Other Business/Adjourn

Thursday, May 5

8:30 – 11:00 a.m. **Interstate Fisheries Management Program Policy Board**
Member States: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida
Other Members: DC, NMFS, PRFC, USFWS
Chair: Woodward
Other Participants: C. Upite
Staff: Kerns

1. Welcome/Call to Order *(S. Woodward)*
2. Board Consent
   - Approval of Agenda
   - Approval of Proceedings from January 2022
3. Public Comment
4. Executive Committee Report *(S. Woodward)*
5. Consider Changes to the Appeals Policy *(R. Beal*) **Final Action**
6. Update on Mode Split Work Group *(R. Beal)*
7. Report from *De Minimis* Work Group *(T. Kerns)* **Possible Action**
8. Update on East Coast Climate Change Scenario Planning *(T. Kerns)*
9. Committee Reports
   - Law Enforcement Committee *(T. Kerns)*
10. NOAA Report on Sea Turtle Bycatch in Trawl Fisheries *(C. Upite)*
    - Review Stakeholder Outreach on Action to Develop Bycatch Reduction Measure to Reduce Sea Turtle Takes
11. Update on MAFMC's Consideration of Re-initiating the Research Set Aside Program *(R. Beal)*
12. Review Information Related to Tautog Commercial Tagging Program *(J. Boyle)*
13. Review Noncompliance Findings (if necessary) **Action**
14. Other Business/Recess

11:00 – 11:15 a.m. **Business Session**
Member States: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida
Chair: Woodward
Staff: Beal

1. Welcome/Call to Order *(S. Woodward)*
2. Board Consent
   - Approval of Agenda
   - Approval of Proceedings from January 2022
3. Public Comment
4. Consider Approval of Amendment 7 to the Interstate Fishery Management Plan for Atlantic Striped Bass *(M. Gary)* **Final Action**
5. Consider Noncompliance Recommendations (if necessary)
6. Other Business/Adjourn

11:30 a.m. – Noon **Interstate Fisheries Management Program Policy Board and Mid-Atlantic Fishery Management Council**

Member States: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida
Other Members: DC, NMFS, PRFC, USFWS
Chair: Woodward
Staff: Kerns

15. Reconvene with the MAFMC
16. Initial Discussion on Commission Harvest Control Rule Draft Addenda and MAFMC Framework *(D. Colson Leaning, J. Beatty)*
17. Other Busines/Adjourn

Atlantic States Marine Fisheries Commission

Atlantic Coastal Cooperative Statistics Program Coordinating Council

May 2, 2022
10:00 a.m. – Noon
Hybrid Meeting

Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary.

1. Welcome/Call to Order *(J. Carmichael)*

2. Council Consent
   - Approval of Agenda
   - Approval of Proceedings from October 2021

3. Public Comment

4. Consider Funding Decision Document and FY2023 Request for Proposals *(J. Simpson)* **Action**

5. Committee Updates
   - 2022 Data Accountability Report – Completed (ComTech)
   - Status Update on 2023-2027 Atlantic Recreational Implementation Plan (RecTech)
   - Status Update on Methodology for Logbook Estimates of Catch and Effort with Dockside Validation (RecTech)

6. Program Updates

7. Other Business/Adjourn

The meeting will be held at The Westin Crystal City (1800 Richmond Highway, Arlington, VA; 703.486.1111) and via webinar; click here for details

DRAFT PROCEEDINGS OF THE

ATLANTIC COASTAL COOPERATIVE STATISTICS PROGRAM

COORDINATING COUNCIL

Webinar
October 19, 2021

These minutes are draft and subject to approval by the
Atlantic Coastal Cooperative Statistics Program Coordinating Council
The Council will review the minutes during its next meeting.

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INDEX OF MOTIONS

ATTENDANCE

Council Members

Bob Beal, ASMFC
Pat Keliher, ME
Renee Zobel, NH
Dan McKiernan, MA
Jason McNamee, RI, Vice-Chair
Colleen Bouffard, CT, proxy for J. Davis
Melissa Albino Hegeman, NY, proxy for J. Gilmore
Joe Cimino, NJ
Kris Kuhn, PA, proxy for T. Schaeffer
John Clark, DE
Lynn Fegley, MD
Lewis Gillingham, VA, proxy for P. Geer
Dee Lupton, NC, proxy for K. Rawls
Mel Bell, SC, proxy for P. Maier
Kathy Knowlton, GA, proxy for D. Haymans
Erika Burgess, FL, proxy for J. McCawley
John Carmichael, SAFMC, Chair
Brandon Muffley, MAFMC, proxy for C. Moore
Mike Millard, USFWS, proxy for L. Whitney
Max Appelman, NMFS
Marty Gary, PRFC
Richard Cody, NOAA

Staff

Toni Kerns
Laura Leach
Lisa Carty
Tina Berger
Pat Campfield
Maya Drzewicki
Kristen Anstead
Emilie Franke
Chris Jacobs
Jeff Kipp
Savannah Lewis
Kirby Rootes-Murdy
Sarah Murray
Joe Myers
Marisa Powell
Heather Power
Mike Rinaldi
Julie Defilippi Simpson
Caitlin Starks
Deke Tompkins
Geoff White

Guests

Renee St. Amand, CT DEP
Robert Anderson
Pat Augustine, Coram, NY
Chris Batsavage, NC DENR
Alan Bianchi, NC DENR
Delayne Brown, NH FGD
Jeff Brust, NJ DEP
Tom Burrell, PA F&B
Andrew Cathey, PA F&B
Heather Corbett, NJ DEP
Nicole Lengyel Costa, RI DEM
Sen. Ronnie Cromer, SC (LA)
Jessica Daher, NJ DEP
Russell Dize, MD (GA)
Wes Eakin, NYS DEC
Warren Elliott, PA (LA)
James Fletcher, Wanchese Fish
Tom Fote, NJ (GA)
Alexa Galvan, VMRC
Pat Geer, VMRC
Shaun Gehan, Gehan Law
Hannah Hart, FL FWC
Doug Haymans, GA (AA)
Matthew Heyl, NJ DEP
Helen Heumacher, US FWS
Asm. Eric Houghtaling, NJ (LA)
Raymond Kane, MA (GA)
Rob LaFrance, Quinnipiac Univ
Wilson Laney
Loren Lustig, PA (GA)
John Maniscalco, NYS DEC
Jerry Mannen, NC (GA)
Steve Meyers
Roy Miller, DE (GA)
Sen. Craig Miner, CT (LA)
Allison Murphy, NOAA
Brian Neilan, NJ DEP
Lindsey Nelson, NOAA
Gerry O'Neill, Cape Seafoods
Derek Orner, NOAA
Willow Patten, NC DENR
Cheri Patterson, NH (AA)
Nicholas Popoff, US FWS
Craig Pugh, Leipsic, DE
Jill Ramsey, VMRC
Eric Reid, Kingstown, RI
Adam Rettig, NOAA
Harry Rickabaugh, MD DNR
Brandi Salmon, NC DENR
Tara Scott, NOAA
Melissa Smith, ME DMR
Somers Smott, VMRC
Beth Versak, MD DNR
Megan Ware, ME DMR
Lowell Whitney, US FWS
Wes Wolfe, *The News-Leader*
Chris Wright, NOAA
Sarah York, NOAA
Erik Zlokovitz, MD DNR

The Atlantic Coastal Cooperative Statistics Program Coordinating Council of the Atlantic States Marine Fisheries Commission convened via webinar; Tuesday, October 19, 2021 and was called to order at 11:00 a.m. by Chair John Carmichael.

MR. GEOFF WHITE: Welcome everybody to the fall Coordinating Council meeting. As you saw from our agenda, we're really focused today on the Proposal Review, and 2022 funding discussions. The monthly committee updates have been going out, so we assume you have those. With that I will turn it over to our Chair, John.

CALL TO ORDER

CHAIR JOHN CARMICHAEL: Okay, thank you, Geoff.

APPROVAL OF AGENDA

Getting through the sound checks and all the introductions, so the first order of business is Consent on the Agenda. Are there any changes or additions to the agenda, or other business to add to it at this time? No hands, Geoff?

MR. WHITE: No hands.

CHAIR CARMICHAEL: Okay, we'll take that as consent.

APPROVAL OF PROCEEDINGS

CHAIR CARMICHAEL: The other item is Consent for the Approval of the Proceedings from August, 2021. Does anyone have any additions, changes, edits or objections to approving the minutes? Please, raise your hand.

MR. WHITE: So far, no hands.

CHAIR CARMICHAEL: All right, thank you, Geoff, consider the proceedings approved.

PUBLIC COMMENT

CHAIR CARMICHAEL: The next item is Public Comment, are there any members of the public that would like to make a comment, please raise your hand and let staff call on you.

MR. WHITE: I see no hands.

CHAIR CARMICHAEL: All right, thank you, Geoff. With that I think we're ready to move into our business. I pass it back to you.

MR. WHITE: Outstanding. The meat of the matter. Of course, we've got the FY2022 submitted proposals. Our Deputy Director Julie Simpson has been leading this through the Operations and Advisory Committee, and will lead off with the majority of this presentation. Julie, take it away.

CONSIDER RECOMMENDATIONS FOR FY2022 SUBMITTED PROPOSALS

MS. JULIE DEFILIPPI SIMPSON: These are the average rankings of the maintenance proposals, so it is the average of the Operations and Advisors scores. What you should note here, this is the same spread sheet that you had in your materials. What you'll note is that there are two proposals that fall to the bottom, and are beyond the expected funding in this particular spreadsheet.

The PRFC electronic trip level reporting and then also the expansion for the Law Enforcement application. Depending on whether we're in the 3.5 or 3.35 range, we do have somewhere between 100- and 200-thousand-dollar shortage in the maintenance proposal. This is the average ranking for the new proposals.

Again, we fall a little bit short, but just for one project. That is for the New Jersey shad DNA and bycatch project. Since the Operations and Advisory Councils have met, there have been some changes behind the scenes, and I want to go over those with you on the next slide. The first one is that the ACCSP Admin Grant has been decreased by just a little over $70,000.00.

We were able to do this because we were able to get some Help Desk support from some other funds. What this has enabled us to do, with some savings elsewhere, is to without changing any of our services, decrease the Admin Grant by about $70,000.00 from the proposal reviewed by the Committees. The other item that has changed is that the North Carolina Electronic Quota Monitoring has been withdrawn from ACCSP funding, so that frees up another $63,854.00.

Big kudos to North Carolina staff, because they really thought a little bit outside the box. They put their proposal in for the ACCSP funding, but they also put their proposal in through the FIS process. Their project got funded through that FIS project, and therefore they didn't need the ACCSP funding.

NC was recognized in the Operations Committee and Advisory Committee meetings, as really thinking ahead and trying to find the best way for us to reach all our coastal objectives when there is not as much money as we might need. That is another $63,000.00 that is "back on the table" so to speak.

A couple of other notes are on the right-hand side of the slide. The first is that the PRFC Electronic Reporting, you will note that that was the next to last project in the maintenance on your spreadsheet when you got it. There was discussion at Operations and Advisors about the ranking, and how this one fell to the bottom.

The general consensus is that this is an absolutely worthy project. It is recognized that PRFC is pretty new to the process, and that the person who was putting the proposal together has only done that for this year. There were some places, such as indirect funding that weren't in the proposal, and so it caused them to lose points and have a lower ranking.

But that's just the result of the way that the proposal was put together, not so much the quality of the project. That was something that we felt was important from their discussion to bring forward and note to you all. The other item that we did want to note as part of that discussion, is that the Law Enforcement application as it went through that first year of its pilot, some of the things that were proposed changed a little bit. In particular, it doesn't actually collect data. Folks felt that expanding it, because of the way it went through the pilot, that it was no longer really inside the scope of the ACCSP core mission, and therefore the scope of the RFP. That one is actually ranked accordingly.

What we've done on the next couple of slides is taken into account these three red arrows, and made some adjustments to that. This is an updated version of the average ranking for the maintenance projects. At the top there is the yellow circle there. You can see the Admin Grant. That number has been decreased.

Then at the bottom of the list you can also see that we removed the cost for the Law Enforcement application, with the assumption that it was out of scope, based on the previous discussion. What you can see here is that this now leaves us in a position where, depending on the exact level of funding the PRFC Grant will be funded potentially in full, if there is the whole 3.5 million, which we can get to in a moment, but it was at least partially funded at the very lowest of levels.

This is the change that we'll see in the updated average ranking for the new proposals. You'll see that we removed the North Carolina cost, because that is being covered elsewhere. This actually does leave some money on the table that can be brought up above and used in the maintenance projects. Again, that number varies based on the level of funding.

The next item that I want to address are the recommendations that came from the Operations and Advisory Committee. For the maintenance proposals, the salient recommendation that they had here was that a project that is being funded on

the portside commercial sampling and bycatch for herring, mackerel, and menhaden.

This has been a project that has been quite a long-term project. One of the things that everyone discussed was that there is recognition that if this project isn't funded moving forward, that that would put these species back on the biological matrix as a high priority, and now we would have to have discussions about hey, do we then start funding this project again?

If we went through that process, that is going to result in data gaps, when there is already a long-term data series. The recommendation is that the partners that are involved in the sampling for this project get together and discuss how we can move forward with this project in such a way that we can avoid those data gaps, and moving the species back onto the biological matrix.

For the new proposals, they recommended that if the North Carolina proposal was funded by FIS, which it was, then the remaining funds should be distributed to the new proposals first, and then moved up to the maintenance proposals. That is the end of my presentation, so I will turn it back over to Geoff, to go over the next slide.

MR. WHITE: Excellent, thank you, Julie, for leading the group through the details of all the proposals and moving parts. Just as a note these adjustments that have been made reflect kind of an overall move to the core mission of the projects where you should see staff and partner actions to balance available funding across the Admin Grant and the partner projects. I certainly appreciate everyone's activity to direct their proposals and the options on the table as efficiently as possible. John, at this point did you ask for questions on the spreadsheets and the rankings and the Operations and Advisors points, or would you like me to go to the next slide on the Admin Grant?

CHAIR CARMICHAEL: Yes, Geoff, I think it would be good to see if questions, and I just want to say, thanks to the Ops Committee and the Advisors for this. I have been there and done that, as many of us have and know what a task that is. Really appreciate their efforts, and how they do always look out for the intent of the program, and try to make recommendations that are best for data collection at the end of the day. I think they just do a great job. I can't thank them enough for what they do to make our job a little bit easier. With that said, just open up the floor and see if anybody has any questions on the recommendations or the matrix as it stands now.

MR. WHITE: Brandon, I see your hand up, go ahead, and then followed by Richard Cody.

MR. BRANDON MUFFLEY: Thanks, Geoff. Just in regards to the top bullet here on the maintenance proposals and on the portside commercial catch sampling. I'll follow up with Council staff to talk through the needs on Atlantic mackerel and the use of the sampling program here.

But maybe I would just recommend that maybe not just talking through the states, but maybe including the federal partners in any of that discussion, to see if we could think through how we could fund and continue to do the sampling, because I think obviously, we need to have the states involved, but getting some of the federal partners like the Council, engaged in that discussion I think would be beneficial.

MR. WHITE: Thank you, Brandon, we could certainly do that. While the Ops discussed this recommendation if the desire for ACCSP to participate in these discussions, or even organize or facilitate them, that is totally something that we can do. Because this is specific to the herring, mackerel and menhaden sampling, I do want to just remind folks that it was a highly ranked project, it's in its last year of funding, and it is in the FY22 support at about the $26,000.00 range. Brandon has his hand down; John are you okay with me just running through the hands up?

CHAIR CARMICHAEL: Yes.

MR. WHITE: The next one I saw was Richard Cody, go ahead.

MR. RICHARD CODY: John, this is probably just more of a comment than anything else. But since most people realize the importance of the commercial catch sampling for herring and so on, but I think it does raise a question of exceptions to the rules that were sort of put in place for maintenance versus new proposals. I think that should be part of the discussions going forward as well.

What constitutes an exception, and then perhaps, are there other mechanisms that could be used for partial funding or some way to keep the program alive, basically, so we don't have these data gaps, and maybe some kind of a risk analysis for the other surveys that are maintenance currently that possibly fall into this realm. That is all.

MR. WHITE: I think a lot of those brainstorming ideas would fall to the group as it goes. One thing I do want to point out is Maine has done a good job of covering the primary sampling in Maine, and the amount of funding that remains is really about sending Maine staff into other states to do the portside sampling.

There have been discussions and reports that other states were able to pick up some of that sampling, when travel hasn't been allowed over the last few years. Again, that is one of the items that is probably in the mix for this to be discussed. The next hand I saw up was Lynn Fegley. Go ahead.

MS. LYNN FEGLEY: This is sort of maybe philosophical and possibly rhetorical. I want to say that I was a little bit discomfited by the idea that the PRFC proposal fell to the bottom because of a formatting issue, so I think the wording was, this is a great use of ACCSP tools, it satisfies, it's a very good project. They just didn't have an experienced proposal writer, which makes me wonder.

You know if you have a really expert proposal writer who scores well, but the project is not as worthy. It makes me worry a little bit if maybe we need to see scores broken down. It just worried me a little bit that maybe, are we really ranking these proposals to what is the most important and valuable piece we need to fulfill? I don't know why that sort of bothered me a little bit, but it kind of did.

MR. WHITE: If you guys will allow me a moment. I had Kathy's hand up and also Marty Gary. That language choice was mine, and it was the Operations Committee and our Advisors Committee discussions about, was the in kind funding included in the proposal, and the ranking sheet included that part as well. There was a lot of recognition from everyone on the Operations Committee, and Julie, if I miss something please add in when I'm done. They've all learned over the years how to kind of write the proposals and follow the format.

When they (other partners) were new, they got guidance as well. My goal in transparency in this language, and putting this on screen for the Coordinating Council, is to recognize exactly where the scores came out, a little bit of understanding about why that happened, if it hasn't already been shared by your Operations-Committee members and Advisors to you, and kind of help out with that. That was the intent. Kathy, if you don't mind, I think I'm going to go to Marty Gary next and come back to you. Marty.

MR. MARTIN GARY: Thanks, Geoff and John, and thank you, Lynn, for weighing in and thank you, Julie. Thanks all around. Julie, thanks for adding that narrative to that slide, so folks have some semblance of what PRFC is dealing with. The abridged version would be, we're tiny, there are only five of us.
We don't have a full time IT person so we have a contractor who is brand new to us. Our previous contractor had worked with us since the early nineties, and we just went through a transition, so we're really working with a very limited capacity to put together these proposals. It's new to us, I'm trying to provide as much time and effort to help our

contractor and stay engaged with us. We also understand there is a lot of great projects at play along the coast, and we all have to work together to give and support, to make sure the greater good is accomplished. But we are coming out of the dark ages.

PRFC has been paper only. We have a great baseline framework to work from. We have trip level daily reports submitted weekly, as opposed to monthly for a lot of entities and jurisdictions. We have strong accountability in our process for accurate and timely reporting. We think we are a great candidate to keep this going, and get us out of the dark ages and into the light with electronic reporting.

To that end we're going to do the very best we can with whatever funding we're afforded. But we don't really want to see anybody else be compromised. You know we want to work with everybody together. I guess the end story here is, we're doing the best we can with what we have, and we're going to continue to do that within the process. I just appreciate both Julie and Lynn providing a little bit of clarity to our scenario, so thank you.

MR. WHITE: Julie, I gave you a hint of an opportunity to weigh in with details at this point.

MS. SIMPSON: Yes, sure. I think you covered a lot of it. There were just some items that do get points, like the in kind you get the certain number of points for whatever percentage, and because that part was missing it meant that they couldn't get those points. But I think one of the other things, to Lynn's point, is that there was great discussion that happened at the Ops and Advisors.

I think it also speaks to John's comment earlier of all the great work that they do, because they noted that hey, this project fell to the bottom, but it was only because of some technical details that came out because of the way the ranking gives you points for, hey you included all of the right aspects so you get points for that, and hey you have in kind and you get points for that.

A couple of those things were missing, so it was more of a technicality than a real result of what they felt was worthy. That's why we wanted to make sure that that discussion came forward from them. But they also similarly have discussions for things that maybe rank higher because of the technicality, because it's really well put together, but just aren't as worthy.

I think Lynn is right, those discussions do happen, and that's why it's really good to bring the discussion forward as well as just the math. I will say that Blair, who is the IT contractor, did speak up and ask for advice, and was offered a number of helpful points for next year. From a process standpoint it was also a great discussion.

MR. WHITE: We have three hands up, let's go back to Kathy and then we have Dee Lupton and Renee Zobel after that, so Kathy, go ahead.

MS. KATHY KNOWLTON: Good morning. Two points, one that's popped up in the most recent discussion to Lynn's point. They are in the ranking process, I just wanted to add this. There are a lot of the points derived from a broad range of points that are available for which ACCSP module the project falls within. Operations and Advisors have a lot of discretion for how many points are awarded in that section. I understand your concern, Lynn, but I feel confident that the ranking and the matrix that has been developed just because of projects, can tick off the bullet points for certain components that might give it points.

There are a lot of points that are in that model section as well, and the Operations and Advisor member knows that just because something is in there doesn't mean they have to actually give it that point if there is a problem with that component. I understand why you were concerned, but I know from my years of doing this that those kinds of concerns can be addressed through the ranking process. I hope that was okay to add.

Then with the comment on the portside commercial catch sampling, to Richard's point about an exception. I hope that that part of the discussion goes back to Ops and Advisors, and it's something for the Coordinating Council to think about, because that's exactly the kind of thing that originally, not take an extra point, Richard, but it's the exact kind of thing that we set up the phase out to avoid, is for there to be exceptions.

However, there is going to be probably one off that because of the nature of the project, like this one, in terms of the need for the data. Not only is it long term, but for the stock assessment, that it might have to result in some sort of other option. I just think that was really interesting. It's not something I had thought about in the years of doing this, that a data gap for a specific species could make it pop back on as a priority in the biological matrix.

The same could be true for the bycatch matrix, with if there is a data gap based on a gear type. I think that is something that has never occurred to me before. I appreciate you all making the point, and it's something that I would like to just encourage the Coordinating Council members to think about.

Keep this at the forefront of our minds as we move forward, because we're on the very cusp of being able to have all the projects that were funded for 15, 20, 25 years phase out. I think this is going to be very interesting moving forward, and I really appreciate that you guys made that point for us so clearly. Thanks.

MR. WHITE: Thank you, Kathy, appreciate those points. The next person I had was Dee. Dee, take it away.

MS. DEE LUPTON: Good morning. I have to point out an observation I have about the Potomac River Project. It has nothing to do with their IT project, that we allowed an extension of the step-down process from 5 years to 6 years due to COVID. I think three projects had resubmitted, and they're all above the Potomac River.

You know, and this group made that decision to allow that extension. I think that actually hurt Potomac River during this process, regardless of the ranking criteria, three of those projects that probably should not have had a project in here this year, if they weren't here may have made up the money for Potomac River. I just have to point that out as an observation. Some of those projects have been on here since 2000 and 2001. Just an observation that when I was reviewing these I was like, well this is what I thought may happen in my own mind that would have occurred. I don't have a solution here, because we made those decisions so we'll abide by those decisions, to allow that extension.

I do believe if we go down the process of allowing exceptions, it will have to be vetted out very clearly what is an exception. I recognized actually for this project, that it would, if we take them off, and I think there have been other species that if we didn't fund the items that their biological rankings would come up higher.

I think some of the snapper group aging work was in that same boat as that. You know other projects, whether it's a catch and effort program. You know if they don't get ACCSP money we have data gaps. You know the ACCSP has always been dealing with that issue. I had no problem researching and discussing thoroughly exceptions.

But I also see that the step-down was to allow for people to wean off the money and continue to fill those data gaps and seek other funding sources. I think you have an example here, where when there is basically an exception, which we had for the six year, that one project that is a good project may not get all its funding. That's just some points I wanted to point out.

MR. WHITE: Dee, thank you for raising that. The last hand that we have up at the moment is Renee, and

Renee when you're done, John, I'm going to ask you to summarize and take the next direction.

MS. RENEE ZOBEL: Kathy kind of picked a point right out of my mouth with that first point. Also, as a long-term Ops member, Lynn, I understand your reservation with the process. There is a lot that goes into that ranking process, and it is easy to discern something that is just not properly prepared, but has good merit.

There is, the bulk of the points are in that module. That is an area where there is a lot of discretion on each member, and that's where the primary point scoring happens. My second question, and I think I heard Marty address this. But if the PRFC project wasn't funded completely, I'm assuming, but I wanted to ask the question. Could they be partially funded, Marty, and could you guys still make good use of those funds?

MR. GARY: Thank you for asking. I did talk to Blair, our contractor, who is on the Ops Committee and he was in attendance. As Julie noted, he participated in the discussion. The original two scenarios, I asked him, you know we set down and we tried to characterize what we would be able to achieve.

Under the first scenario, and Julie you might have to help me, because I'm kind of getting confused with what was presented today versus the original two options coming out of the Ops Committee. But the first scenario the higher level of funding, we agreed that we could make some tangible progress. The second tier of lower funding, it's like we're treading water, for lack of a better term. We could continue the program, but it would be questionable how much progress we would be able to make. That's probably unfortunately the best way I can answer that.

MR. WHITE: Marty, this is Geoff, I appreciate that. There have been a lot of moving parts here. With the change to the Admin Grant, and this is kind of the updated ranking of maintenance proposals. I wanted to at least take a moment. The columns to the right, 3.5 versus 3.35 funding scenarios are the two kinds of upper and lower bounds that we've historically dealt with, and usually we fall somewhere in the middle.

This is probably a good time to say, if we're similar funding to last year, I'm expecting we'll be in that $3.4 to 3.5M range, which would in this case, take care of almost all of the PRFC proposal. If that works out, the maintenance funding and the admin approach look like it will support the next year of PRFC at nearly the full requested amount, which is $215,000.00. With that, John, do you want to?

CHAIR CARMICHAEL: Sure, Geoff, thank you, and I appreciate you pointing that out. I think it's been good discussion. We've certainly helped clarify the record and the process here some, you know even raised some other points about the potential consequences of decisions, such as extending the maintenance another year, which aren't always thought about.

Thanks to the members who raised all of these issues. I would say it sounds like there is a lot of support here for funding the PRFC project, and as Geoff pointed out, if we get funding along the lines of what we received last year, then it seems that the entire project can be funded. If we get the lower bound of funding it's going to be about 100K short.

I guess if that's what happens, once we see the funding, perhaps you know I think PRFC considers what they can do with that, and we consider what other developments happen. As seems to be the case in many years, you know we get a project that's on the bubble, and quite often we're able to get it close enough to where they can move forward and make progress.

I think that sort of sums up where I see it right now. We do have the big unknown of the funding that we're going to actually get. But it does sound like everyone supports funding that, and I didn't hear any objection to dropping the Law Enforcement App from consideration, so I think that is sort of where

we're left, with either PRFC being fully funded to being potentially 100K short at the lowest funding level.

MR. WHITE: I don't have any more hands at the moment, so I'll pause before I just jump forward to the Admin Proposal slide. I still see no hands. At this point I'm going to provide a little bit more information about the Admin Proposal for next year. As we already covered, we reduced about $70,000.00 off of this for taking away SAFIS Help Desk support specifically.

This proposal does add in one software staff member, and reduces some contract support for development of mobile applications, as we begin to onboard that process. This software staff member was put into the proposal and discussed last year, and chosen to delay that decision for a year, as we developed this proposal I did speak with John and Jay and the leadership team, to keep that in, and see where things ended up at this meeting, and after proposal ranking. The real benefits to bringing on the additional software staff member is more timely development of the ACCSP priorities, including the electronic dealer reporting redesign. But this last year's focus has been the eTRIPS mobile and online and upload redesign. That aligns the processing as of the data, adds a whole lot of flexibility, and really it makes the data quality flowing through the old system at a very consistent level.

There have been more changes, or adjustments to eTRIPS requested by partners. Because of all that extra time and effort that went into the setup, some of those occur amazingly quickly. It's been really impressive to watch that, and partners work through some of those issues and be like, oh well, because of the new design we'll just change this and this and this, and in a matter of hours, some requests have been met.

That's where we want to go with more of the software design on the dealer reporting side. That's where we recognize need for registration tracking type things, which are in the Action Plan, so a little foreshadowing for tomorrows Business meeting. That's why the software staff was in there, and because it's been such a point of discussion for the Coordinating Council, staff growth, the needs and the tradeoffs between ACCSP staff testing software and partner staff testing software.

Sometimes partner staff just don't have the time to do that testing in all the variety of ways, where the user account, the permits, the questions that show up on the screen are really fully tested and vetted. Adding that in as a staff position and functionality, really kind of brings in-house a bit more capability.

That ultimately is to keep up with the list of changes that are useful and requested by regulations and partners to move forward. That's in the material as a supporting document to the Admin Proposal, but I wanted to make sure again it was transparent that we covered that, in terms of the future outlook.

We have been reviewing and looking at the very valid discussion points before of, is this a continual uptick in ACCSP staff size, and the stable staffing levels is a point to say no, this looks like it's going to be where we want to be for quite some time. It maintains the support of integrated coastal data collection, working with the federal and the state partners to align things through the one-stop reporting approach, as well as additional regulatory needs.

I want to again holler out thanks to North Carolina, but also point out ACCSP has two projects funded by FIS for the attribute validation for some of the at-entry checks, make sure that the data are clean and valid, in terms of the codes that are going in, as well as support for FISMA for some approaches that are required for our data connections with our federal partners, and has certainly had good benefits for both the federal partners and our data sharing, as things move forward.

Tried to avoid the too tech-y in the weed's summary here, but those are some of the perspectives that we're considering, as we presented the Admin Proposal for this year. I'll pause there and ask John

and others if you have questions for us. I see a first hand from Kathy Knowlton, so Kathy, go ahead.

MS. KNOWLTON: Having been with this group for a really long time, I've never been a huge supporter, I guess, of seeing the Admin Budget go up, in terms of growth. This is actually going to end up being a positive comment, Geoff, don't worry. I've always had caution; you know I've always been in a crew that is "use this with caution."

I think there are appropriate discussions when you have an Admin budget that is 2.2 million of an expected maximum 3.5. I appreciate the flexibility last year to delay bringing in this new software staff position. But I think when it comes to expanding the software ability and reducing our reliance on contractors.

If we want the program to keep growing then we have to add this position. If we want the program not to be able to continue to grow, that could be a decision that we make, or if we have a budgetary crisis in the future that's always a possibility. But in order, there is what 23 partners in ACCSP, and the majority of them are working on either catch effort modules or biological modules that are actively utilizing the data support team weekly, monthly, annually.

There are projects like the Citizen Science Program that's got a developing, customizable App for our partners to use. I think we just have to take a minute to remember all of the work that is done by the software development team. It helps us not only fulfill our regulatory obligation, in terms of our partnerships with our federal partners, but it allows the state partners.

I can speak from experience, we have IT with Georgia DNR in Atlanta, but we don't have it locally. Some of the only ways we're able to get this work done is in our partnership through ACCSP. Though I am not a huge fan of seeing the Admin Budget grow, I think this was an appropriate decision, and I just wanted to speak in support of that. Thanks, Geoff.

MR. WHITE: To the hand I have up, who is Bob Beal. Go ahead, Bob.

EXECUTIVE DIRECTOR ROBERT E. BEAL: Just to sort of follow along Kathy's comments, if I might. You know I understand why we're suggesting adding the new software staff, and I get it, and for all the reasons that Kathy mentioned. But I think in the presentation today, you know in Julie's slides it says the Admin Grant was going down $70,000.00. I think it's important to note that it went down $70,000.00 from the original ask of this year. But when you compare the Admin Grant that's proposed for '22, Geoff, is it up about $150,000.00 or so from FY21 the current year?

MR. WHITE: In terms of what was actually funded last year, yes, that would be true. The number on the screen, the 2.2 million is actually very similar to what was originally requested last year, and there was a lot of give and take last year to reduce the Admin Grant.

EXECUTIVE DIRECTOR BEAL: You know I think, you know this is an obvious statement, but the more that goes into the Admin Grant the more we're going to have conversations similar to what we had with PRFC. I'm not saying I don't support the growth on staff. I know they're doing a lot of work. They're all busy, they're all flat out. I see them every day cranking things away. It just needs to be a very conscious decision, I think, of the Coordinating Council, the tradeoffs between partner project funding and staff funding. You know we need to be very deliberate about, is this the right balance between the two. You know it is good to see what Geoff has on the slide here about future outlook that if we were to hire this new software person, we can probably stay stable at that level of funding for some time in the future, as he was saying. As Kathy said, reducing the reliance on contractors is great. The way it's proposed right now it's not a one-to-one ratio of we didn't spend a dollar on software person and saved a dollar on contractor.

We're spending a little bit more this year than we are reducing our contract support. Hopefully in the out years we can balance that out a little bit more, and as the new staffer gets up to speed, we can even reduce contractor support even further and make up the difference, is what I'm hopeful for.

Again, just sort of piling on. It is a tough balance, it's a zero-sum game, where ACCSP has been fixed for a really long time, probably too long of a time with the in between 3.5 and 3.35, and maybe that's really what we really need to work on, is figuring a way to try to get some more money in just data collection projects coastwide, so we can cover what the partners need to do, as well as what staff needs to happen. Just wanted to make those comments, Mr. Chair, thank you.

MR. WHITE: We have two more hands up, the next is Pat Keliher and then back to Kathy Knowlton.

MR. PATRICK C. KELIHER: Just a question to you, Geoff, on timing of the new staff and bringing them on. Just wondering if there is some logic in just waiting to see where the final number comes in before that staff person is brought on, and seeing what those numbers look like. I'm sensitive to the needs of PRFC, considering the size of their shop, the fact that this would be a major game changer for them if we can find a way to fund them in their project.

I'm just wondering if there is a way to balance this out a little bit. I say that, I don't want it to sound like I'm not supporting the need for a new staff. Those issues are real, the future outlook. I appreciate how you've laid that out. The one thing that is kind of the big question mark that is not on the future outlook.

It's going to be lobster tracking if ACCSP is going to have a big role with that data storage, and how that's going to impact numbers and admin cost going into the future. Anyway, I'm starting to ramble, Mr. Chairman, but I'm just wondering if there is a balanced approach here that we could think about, so we could find a way to resolve this issue of funding for PRFC.

MR. WHITE: Would rather call on John a little bit here, but I'm certainly in support of when those numbers come through, working with the Leadership Team on what those timelines are. It felt lengthy to include the entire action plan it needs to get to be meeting here, when that will be handled under the Business Meeting.

Really, it's the big point that you're all making about priorities of, what do we get done as a group in the Action Plan, versus what do we wait on. The hiring process takes at least three months, at least. We're right now backfilling a couple of open positions, and the point is well taken of making sure the partner projects get funded here, and balancing out the timing of the staff position with the leadership team, once we know more about the Congressional process. John, did you want to add to that?

CHAIR CARMICHAEL: Sure, Geoff, I appreciate the opportunity, and I think that many of us share the sentiments echoed by Kathy and Bob looking at the Grant. The long-term outlook and balance for the admin versus projects are certainly an important topic. We all know how much ACCSP has come to be relied upon for so many things, and the reach has expanded and the scope of data has expanded, and that's certainly going to continue.

I do wonder if there isn't an option, you know Geoff, to potentially just tap the brakes a little bit on filling the position, until we do see how much money actually comes through. That seems like a pretty easy to accomplish compromise that may not have a whole lot of negative impacts, as far as this staff person. Am I wrong on that, or do you see something that that makes sense, and when do we think we know? I'm trying to remember when we find out. I guess it's all tied on the federal budget process. None of us have a crystal ball for that thing.

MR. WHITE: Given the current continuing resolution and what Congress may or may not do, I have no idea when they're going to get done. I would lean on Bob or somebody else to answer that. Delaying by a few months, and keeping with the idea that it's good to add this person sometime in FY2022, I think I can work with the leadership team and move that way.

I would be concerned about saying let's delay it an entire year during this meeting, without taking some pretty significant items off of the action plan. In the ability to do the work during 2022, so that we can put updated software out in the field in early 2023. The alignment of when the work gets done and when it can be tested and when it can be released in the fishing year, means that the actual time to develop.

The time to learn, is actually pretty far offset from the time to put it in the field in a way that supports all the partners and data collections that paper forms the different data flow systems and the fishermen getting used to it. I know I took a tangent there, but certainly open for those discussions. John, do you want to reply or do you want to call on Kathy, who is our last hand up at the moment?

CHAIR CARMICHAEL: You know I think maybe, I guess the current continuing resolution goes until December, if memory serves. You know maybe we can sit on it until then, and perhaps invoke the Leadership Team at that time to decide whether to say, you know go ahead into January and do this, or do we want to try to find some other way to fund the PRFC Project, because I think that's the bottom line that everyone is sort of looking at achieving is just getting that project funded. With that, you know maybe Kathy has an idea.

MS. KNOWLTON: I don't know that I have an idea. I just have a perspective that when we look at the development of this program over the last 20 years. When we started out and we had ACCSP staff, you know down around the 7 to 9 persons, in terms of what they were covering. Then leaping forward about 20 years. I don't think any of us could have foreseen the reliance upon software development, and the success that has been seen with having reporting tools that have significantly reduced the burden among constituents, in terms of lowering the number of times they are reporting to multiple entities, whether they be multiple states of states and federal. Some of the growth in the Admin Proposal, I feel the need to remind everybody it was because we took on the APAIS, statewide conduct of APAIS. I am by no means advocating that that stop. I think we've seen a huge advancement in that program, and that was due partially, or if not mostly, to the states working through ACCSP for the electronic tablet data collection.

The least that was seen in the potential for increased timeliness and QC happening and reduction of recall bias for being able to correct mistakes after the fact. I think the way we need to brace this, and of course the added transparency that Geoff has been providing the last two years on exactly what those increases are and are not for.

I really appreciate that the time is being taken to have this discussion at the Coordinating Council level, and it's very clear what is being requested. I think the models have changed in the last 20 years. We started off with most of our partners unable to collect 100 percent catch effort in the commercial sector. We've had to work through developing that.

Yet, if you look at the FY22 proposal rankings, you see that the majority of the proposals that are on their last, fifth/sixth year of continued maintenance funding. Most of them are not asking for a lot of money to continue. The mandatory dealer reporting, Maine, Rhode Island, the herring. You know most of those are well on their way to going down.

But I think it is a conversation that needs to continue at the executive leadership level, because it's basically a new model. We've got this, it is a behemoth of even admin proposals, but I almost

think that the term admin isn't even appropriate anymore, because it's really Admin and Operations.

It's not just administering the program. The Admin Budget is the heart of being able to maintain the data warehouse and new developments for partners through software development. I think the place where this needs to pivot is the amount of money. I hope that in no way, Bob, you take that as me pushing back against your comments, because I agree with not increasing the Admin Budget.

But it's very difficult to be able to balance the needs of partners coming in with new proposals. Obviously, we made that step down process, hoping that we were assuring the possibility for more money to go to the new proposals, and to have that ingenuity and entrepreneurship from the partners that ACCSP so needs, and it was designed to promote. I think this is a new sort of, the last three or so years, in terms of having to grow that portion of the staff is a reflection of a very large development in the program itself.

As difficult as it is to have this limitation on funding that will impact new funds. I understand, I am well aware that the situation in Maine with 100 percent lobster reporting is a huge issue hanging over us, and trying to deal with how much support we can get from ACCSP. But understanding all those things, I just wanted to kind of wrap this up and say that it's sort of a new model, that I think we're approaching, so thank you. I hope I didn't make anybody mad with that, by the way.

CHAIR CARMICHAEL: I don't think so, Kathy, I think those are good points, and I think you are right, it is a lot more than what admin was traditionally. It is Admin and Operations, and there is a lot being done, and there is a lot of value to that. Perhaps the Leadership Team can get together next year, and think about some of those points, like where does this Admin Budget go in the future, and what does that mean for funding. You know how do we try to find some way to get the message out there to fit the funding. It probably does need to increase to match the much-expanded mission that ACCSP is pursuing at this point. Geoff, any more hands?

MR. WHITE: We do have one from Bob, and Kathy, I certainly appreciate all of the points you made. I do want to point out two things in response. One of Kathy's was the staff size and the increase relative to taking on MRIP. The MRIP staff are funded out of not the Admin Grant, so we do have three staff that are part of ACCSP, but not included in the Admin Grant, because that is covered by bringing on MRIP funding.

The other is the lobster reporting, whether that will be an actual location tracking or the harvester reporting. There are partner projects that had been funded to continue to support that, and once the systems are in place the number of data records going through is not expected to be an extra-large task from the ACCSP staff. At least pointing those two things out, I do want to make sure I call on Bob. Bob, go ahead.

EXECUTIVE DIRECTOR BEAL: No, Kathy, you definitely didn't make me angry at all, I agree with you. You know the model has changed. The 23 partners rely on ACCSP staff for day-to-day activities and long-term programming activities, and everything else. I agree 100 percent with what you said.

I think my point was just that we need to be conscious about that transition of the model from just we're calling it the old Admin Model, the Admin and Operations. You know I think that needs to just be made consciously, and the partners need to be aware that reliance on that staff is great, and 100 percent appropriate. But we just need to be aware.

It means there is going to be less money available for partner projects. You know if things aren't funded. We need to recognize the reason why they weren't funded, which is, we're putting an investment into the staff, which is the group that we're all relying on to keep things moving along more than we use to.

That's fine, programs transition over, it's been 20 years, so it should be a very different animal than it was 20 years ago. I don't disagree with anything you said at all, Kathy.

MR. WHITE: John, I don't want to force things, but Maya, could you move forward one slide.

CHAIR CARMICHAEL: Yes, Geoff, I think it's time for that and see where we stand.

MR. WHITE: Okay, then John, there you are.

CHAIR CARMICHAEL: We've had great discussion. I think we have good guidance for going forward. At this point we normally would get a motion to clarify the intent of the group, with regard to the proposals and the rankings and where we go, approving the Admin Grant and then what's available for project and funding and the order of those. Open up and see if someone is willing to make a motion.

MR. WHITE: A hand up from Jason McNamee.

DR. JASON McNAMEE: Are you ready for me, Mr. Chair?

CHAIR CARMICHAEL: Yes.

DR. McNAMEE: Okay, and just for the record, Kathy, I'm not mad at you either. I thought what you said was great. Okay, here is a motion. **Move to support the updated ACCSP administrative proposal, the top 7 maintenance proposals, and the remaining 3 new proposals as ranked by the Operations and Advisory Committees. The ACCSP leadership team will be engaged to adjust the actual funding levels when known.**

MR. WHITE: Thank you, Jason, we have a hand up from Lynn Fegley. Go ahead, Lynn.

MS. FEGLEY: I was going to offer a second.

CHAIR CARMICHAEL: I guess, Geoff, the easiest way to probably do it is to just see if there is any objection to the motion, raise your hand.

MR. WHITE: Looking for hands. I see no hands; we'll wait another 10 seconds or so.

CHAIR CARMICHAEL: I'll say if no hands come up, then the motion is approved. Then I think, Geoff, just a clarification. You know if we were to continue on a level funded situation, the funding for this year was that at the 3.4 range?

MR. WHITE: Yes. I would probably have to go back and check on that, but my memory at the moment says we are in that 3.4.

CHAIR CARMICHAEL: If we are continuing resolution for the year and level funded, then we can fully cover the PRFC project.

MR. WHITE: That is my expectation, yes.

CHAIR CARMICHAEL: Thanks. No hands, so motion approved.

MR. WHITE: We now have two hands up for discussion, so first was Jason McNamee and second would be Bob Beal. Jason.

DR. McNAMEE: Yes, sorry, mine is not an objection, I'm not objecting to the motion that I made. But just a clarification. In the text, and it may have been me not saying this, but the text should say after the second comma, and the remaining 3 new proposals. The word new is missing. Thanks.

MR. WHITE: Go ahead, Bob.

EXECUTIVE DIRECTOR BEAL: Just to be clear. Is the expectation that, with John's recent comment that at 3.4 PRFC is fully funded. Does that mean the Coordinating Council is comfortable with starting the hiring process for the software staff member, or does everyone still want to hold off on that until maybe we get the next round of information from Congress after the continuing resolution is

addressed? I'm fine either way, I just want to make sure. Geoff, you have the direction from the group.

MR. WHITE: Thank you, I appreciate that. Comments or response to Bob?

CHAIR CARMICHAEL: Yes, Geoff, I'm trying to think about that and reflect on the timing. You know you said it takes about three months to get it done, and getting someone hired, which makes sense. If we were to wait and see what happens after the current continuing resolution expires in December, that potentially puts us back three months. That might be something the group supports, I'm not sure.

MR. WHITE: The Admin Grant starts as of March 1, 2022 is the normal cycle for that. My best case would not be to announce this position today, it would be to wait until January. I think we do have time to see what happens with the continuing resolution, until we see where we're at in December, and meet with the leaders.

CHAIR CARMICHAEL: Thanks, Geoff, I think that achieves it, then that gives us a chance to see what happens from Congress in December, before you put this into motion.

MR. WHITE: We have another hand up from Kathy Knowlton. Kathy.

MS. KNOWLTON: Jason, I agree with that. That plan sounds very judicious, but also still have an opening as a possibility to the latter half of the fiscal year. Thanks.

MR. WHITE: Mr. Chair, we had no objections to the motion, but haven't captured the status of the motion.

CHAIR CARMICHAEL: I think the motion stands approved, and agreement.to, you know as you said, you wouldn't advertise this until January anyway, so we do have a chance to see where the next funding decision takes us, and allow the leadership team, as it says, to deal with that and keep the group informed, and try to best achieve the intent of the Coordinating Council, working with you and Julie.

MR. WHITE: We are near the end of our primary business. Thanks everybody for your discussion and for your support of ACCSP, the process, the partnerships and the group activities. I did want to note once again that the Action Plan ACCSP is listed primarily under Goal 3, and that review is going to be up for tomorrow for the Business Meeting. I wanted to give you guys a chance. We have until 12:30 if there are questions. I see a hand up from Marty Gary. But if you have questions or thoughts that you want to ask, or things that you would like us to follow up on, either during the meeting or after, now is an opportunity to do so. Thank you for your participation today. With that let me jump over to Marty.

MR. GARY: Thanks Geoff, and Mr. Chair. Not a question, but I just wanted to express my deepest gratitude to all the members of the Coordinating Council, to the Chairman of our Commission, Pat, for your comments, and to all the staff, Bob, Julie, everyone, Geoff, yourself, for working with us to try to put PRFC in a position to succeed, you know as we go into this second year. I'm humbled by the amount of attention you provided to us, and deeply appreciative, so thank you all.

MR. WHITE: All right, Mr. Chair, I see no other hands, so thank you for leading us through this meeting. It is yours to call the question.

ADJOURNMENT

CHAIR CARMICHAEL: All right, well thank you Geoff. If no more comments, I think I'll adjourn the meeting and echo what Marty said. This is a great group to work with, and it is always encouraging how well everyone tries to do the best for the program. With that, we stand adjourned.

(Whereupon the meeting convened at 12:03 p.m. on Tuesday October 19, 2021.)

ACCSP FY23 RFP Summary of Changes

1. RFP

1.1. General Changes

1.1.1. Updated dates appropriately

1.2. Funding Subcommittee Recommendation (**PAGE 2**)

1.2.1. COVID paragraph removed

1.2.2. In consideration of the unique situation the COVID 19 has created, the step down process will be paused in FY22. This means that all maintenance projects in the step down process will be in the same year of the step down process as they were in FY21. All maintenance project submissions that are in the step down process are required to submit an appendix to the proposal with a summary of why the additional funding is needed and if there are any funds from the previous year that were not spent. This status is reflected in Appendix A of the FDD, which has a list of those maintenance projects entering year 6 and the maximum funding available to them.

2. Funding Decision Document

2.1. General changes

2.1.1. All dates have been updated

2.2. Detailed Steps of Funding Decision Process Added Bullet 3 (**PAGE 2**)

2.2.1. COVID paragraph removed

2.2.2. In consideration of the unique situation the COVID 19 has created, the step down process will be paused in FY22. This means that all maintenance projects in the step down process will be in the same year of the step down process as they were in FY21. All maintenance project submissions that are in the step down process are required to submit an appendix to the proposal with a summary of why the additional funding is needed and if there are any funds from the previous year that were not spent. This status is reflected in Appendix A.

2.2.3. Sentence moved from bullet 1 to bullet 2 and edited

2.2.4. Please see Appendix A for a list of maintenance projects entering year 5 or 6 in FY23 and the maximum funds available for these projects.

2.3. Approach (**PAGE 7**)

2.3.1. Language added to clarify that only a single secondary module will be considered for the ranking

2.3.2. Please note that only one primary module and one secondary module are considered for ranking.

2.4. Appendix A (**PAGE 15**)

2.4.1. Change year 6/7 to year 6 to reflect standard (Non-COVID) process

2.4.2. Adjusted language to note that table referred to year 5 and 6 FY23 projects

3. Biological Priority Matrix – No Changes

4. Bycatch Priority Matrix – No Changes

5. Recreational Technical Committee Priorities – No Changes

6. Socioeconomic Priority Data Elements – No Changes

7. Timeline for Proposal Review

7.1. Dates are updated

7.2. Overall timeline remains relatively the same

8. Ranking Criteria Document

8.1. Secondary Module

8.1.1. Language adjusted to add word single

8.1.2. Clarifies that only one additional module will be considered in the ranking

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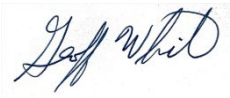
1050 N. Highland Street, Suite 200A-N | Arlington, VA 22201
703.842.0780 | 703.842.0779 (fax) | www.accsp.org

TO: ACCSP Coordinating Council and All ACCSP Committees

FROM: Geoff White, ACCSP Director 

SUBJECT: ACCSP Request for 2023 Proposals

The Atlantic Coastal Cooperative Statistics Program (Program or ACCSP) is issuing a Request for Proposals (RFP) to Program Partners and Committees for FY23 funding.

ACCSP's Funding Decision Document (FDD) provides an overview of the funding decision process, guidance for preparing and submitting proposals, and information on funding recipients' post-award responsibilities. Projects in areas not specifically addressed in the FDD may still be considered for funding if they help achieve Program goals. These goals, listed by priority, are improvements in:

1a. Catch, effort, and landings data (including licensing, permit and vessel registration data);
1b. Biological data (equal to 1a.);
2. Releases, discards and protected species data; and,
3. Economic and sociological data.

Project activities that will be considered according to priority may include:

- Partner implementation of data collection programs;
- Continuation of current Program-funded partner programs;
- Funding for personnel required to implement Program related projects/proposals; and
- Data management system upgrades or establishment of partner data feeds to the Data Warehouse and/or Standard Atlantic Fisheries Information System.

Proposals for biological sampling should target priority species in the top quartile (Attachment II) of the Biological Priority Matrix. Proposals for observer coverage should align with fisheries affecting the top quartile priority species (Attachment III) of the Bycatch Priority Matrix. Brief descriptions of the current levels of biological or bycatch sampling by any of the Partners would be helpful to the review process. Projects for recreational catch and effort data should target the priorities set by the Recreational Technical Committee (Attachment IV). Projects involving socioeconomic data should reference the Socioeconomic Priority Data Elements (Attachment V).

Proposals to continue Program-funded partner projects ("maintenance proposals") may not contain significant changes in scope (for example the addition of bycatch data collection to a dealer reporting project), and must include in the cover letter whether there are any changes in the current proposal from prior years' and, if so, provide a brief summary of those changes.

Additionally, in FY16 a long-term funding strategy policy was instituted to limit the duration of maintenance projects. Maintenance projects are now subject to a funding reduction following their

fourth year of maintenance funding. For maintenance projects entering year 6, a further 33 percent cut will be applied and funding will cease in year 7.

All project submissions must comply with the Program Standards found here. Please consider using this successful project proposal as a template. Overhead rates may not exceed 25% of total costs unless mandated by law or policy. Items included within overhead should not also be listed as in-kind match.

Submissions will be reviewed in accordance with the FDD (Attachment I), ranking criteria (Attachment VII), and funding allocation. Current funding allocation guidelines are 75% for maintenance projects and 25% for new projects within the Program priorities. If either allocation is not fully utilized, remaining funds will be available to approved projects in the other category. For example, if maintenance projects only use 67% of the total available funds, the remaining balance would be added to the 25% new project allocation to fund new projects as approved by the Coordinating Council.

Attachment VI provides a timeline for the FY23 funding process. The final decision on proposals to be funded for FY23 will be made in October 2022. Project awards will be subject to funding availability and, if there is a funding shortfall, awards may be adjusted in accordance with the FDD. Successful applicants will be notified when funding becomes available.

Project Investigators will be required to report progress directly to the Program's Operations and Advisory Committees in addition to meeting the standard Federal reporting requirements.

Please submit initial proposals as Microsoft Word and Excel files no later than **June 15, 2022** by email to Julie DeFilippi Simpson, ACCSP Deputy Director julie.simpson@accsp.org. If you have any questions about the funding decision process, please contact your agency's Operations Committee member (http://www.accsp.org/committees) or ACCSP staff (703-842-0780).

RELEVANT ATTACHMENTS

ATTACHMENT I	FY2023 Funding Decision Document
ATTACHMENT II	FY2023 Biological Priority Matrix
ATTACHMENT III	FY2023 Bycatch Priority Matrix
ATTACHMENT IV	FY2023 Recreational Technical Committee Priorities
ATTACHMENT V	FY2023 Socioeconomic Priority Data Elements
ATTACHMENT VI	FY2023 Timeline for Proposal Review
ATTACHMENT VII	FY2023 Ranking Criteria Document

Funding Decision Process
Atlantic Coastal Cooperative Statistics Program
May 2022

The Atlantic Coastal Cooperative Statistics Program (the Program) is a state-federal cooperative initiative to improve recreational and commercial fisheries data collection and data management activities on the Atlantic coast. The program supports further innovation in fisheries-dependent data collection and management technology through its annual funding process.

Each year, ACCSP issues a Request for Proposals (RFP) to its Program Partners. The ACCSP Operations and Advisory Committees review submitted project proposals and make funding recommendations to the Deputy Director and the Coordinating Council.

This document provides an overview of the funding decision process, guidance for preparing and submitting proposals, and information on funding recipients' post-award responsibilities, including providing reports on project progress.

Overview of the Funding Decision Process

Funding Decision Process Timeline

April- Operations and Advisory Committees develop annual funding priorities, criteria and allocation targets (maintenance vs. new projects)

May- Coordinating Council issues Request for Proposals (RFP)

June- Partners submit proposals

July- Operations and Advisory Committees review initial proposals, PIs are invited (not mandatory) to this meeting to answer questions and hear feedback; ACCSP staff provide initial review results to submitting Partner

August- Final proposals are submitted. Final proposals must be submitted electronically to the Deputy Director, and/or designee by close of business on the day of the specified deadline. Final proposals received after the RFP deadline will not be considered for funding.

September- Operations and Advisory Committees review and rank final proposals

October- Funding recommendations presented to Coordinating Council; Coordinating Council makes final funding decision

ACCSP Staff submits notification to submitting Partner of funded projects and notification of approved projects to appropriate grant funding agency (e.g. NOAA Fisheries Regional Grants Program Office, "NOAA Grants") by Partner

As Needed- Operation and/or Leadership Team and Coordinating Council review and make final decision with contingencies (e.g. scope of work, rescissions, no-cost extensions, returned unused funds, etc.)

Detailed Steps of Funding Decision Process

1. Develop Annual Funding Priorities, Criteria and Allocation Targets (maintenance vs. new projects).

Prior to issuing the Request for Proposals, the Coordinating Council will approve the annual funding criteria and allocation targets. These will be used to rank projects and allocate funding between maintenance and new projects respectively.

In FY16, a long-term funding strategy policy was instituted to limit the duration of maintenance projects. Maintenance projects are now subject to a funding reduction following their fourth year of maintenance funding.

- For maintenance projects entering year 5 of ACCSP funding in FY20, a 33 percent funding cut was applied to whichever sum was larger: the project's prior two-year-average base funding set in FY16, or the average annual sum received during the project's four years of full *maintenance* funding. In year 6, a further 33 percent cut will be applied and funding will cease in year 7. Please see Appendix A for a list of maintenance projects entering year 6 in FY20 and the maximum funds available for these projects.
- For more recent maintenance projects (i.e., those entering year 5 of maintenance funding after FY20), the base funding will be calculated as the average of funding received during the project's four years as a *maintenance* project. These projects will receive a 33 percent cut in year 5, a further 33 percent cut in year 6, and funding will cease in year 7. Please see Appendix A for a list of maintenance projects entering year 5 or 6 in FY23 and the maximum funds available for these projects.

2. Issue Request for Proposals

An RFP will be sent to all Program Partners and Committees no later than the week after the spring Coordinating Council meeting. The RFP will include the ranking criteria, allocation targets approved by the Coordinating Council, and general Program priorities taken from Goal 3 of the current ASMFC Five-Year Strategic Plan. The RFP and related documents will also be posted on the Program's website here.

All proposals MUST be submitted either by a Program Partner, jointly by several Program Partners, or through a Program Committee. The public has the ability to work with a Program Partner to develop and submit a proposal. Principle investigators are strongly encouraged to work with their Operations Committee member in the development of any proposal. All proposals must be submitted electronically to the Deputy Director, and/or designee, in the standard format.

3. Review initial proposals

Proposals will be reviewed by staff and the Operations and Advisory Committees. Committee members are encouraged to coordinate with their offices and/or constituents to provide input to the review process. Operations Committee members are also encouraged to work with staff in their offices who have submitted a proposal in order to represent the proposal during the review. Project PIs will be invited to attend the initial proposal review, held in July. The review and evaluation of all written proposals will take into consideration the ranking criteria, funding allocation targets and the overall Program Priorities as specified in the RFP. Proposals may be forwarded to relevant Program technical committees for further review of the technical feasibility and statistical validity. Proposals that fail to meet the ACCSP standards may be recommended for changes or rejected.

4. Provide initial review results to submitting Partner

Program staff will notify the submitting Partner of suggested changes, requested responses, or questions arising from the review. The submitting Partner will be given an opportunity to submit a final proposal incorporating suggested changes in the same format previously described in Step 2(b) by the final RFP deadline.

5. Review and rank final proposals

The review and ranking of all proposals will take into consideration the ranking criteria, funding allocation targets, and overall Program Priorities as specified in the RFP**.** The Deputy Director and the Advisory and Operations Committees will develop a list of prioritized recommended proposals and forward them for discussion, review, and approval by the Coordinating Council.

6. Proposal approval by the Coordinating Council

The Coordinating Council will review a summary of all submitted proposals and prioritized recommended proposals from the Operations and Advisory Committees. Each representative on the Coordinating Council will have one vote during final prioritization of project proposals. Projects to be funded by the Program will be approved by the Coordinating Council by the end of November each year. The Deputy Director will submit a pre-notification to the appropriate NOAA Grants office of the prioritized proposals to expedite processing when those offices receive Partner grant submissions.

7. Confirmation of final funding amounts

The Director and Deputy Director will be notified by NOAA Fisheries of any federal grant adjustments (e.g. additions or rescissions). Additional funds will generally go to the next available ranked project. Reductions may include, but are not limited to:

- Lower than anticipated amounts from any source of funding
- Rescission of funding after initial allocations have been made
- Partial or complete withdrawal of funds from any source

If these or other situations arise, the Operations Committee will notify Partners with approved proposals to reduce their requested budgets or to withdraw a proposal entirely. If this does not reduce the overall requested amount sufficiently, the Director, Deputy Director, the Operations Committee Chair and Vice-Chair, and the Advisory Committee Chair will develop a final recommendation and forward to the ACCSP Leadership Team of the Coordinating Council. These options to address funding contingencies may include:

- Eliminating the lowest-ranked proposal(s)
- A fixed percentage cut to all proposals' budgets
- A directed reduction in a specific proposal(s)

8. Notification to submitting Partner of funded projects and submittal of project documents to appropriate grants agency (e.g. NOAA Grants) by Partner.

Notification detailing the Coordinating Council's actions relevant to a Partner's proposal will be sent to each Partner by Program staff.

- Approved projects from Non-federal Partners must be submitted as full applications (federal forms, project and budget narratives, and other attachments) to NOAA Grants via www.grants.gov. These documents must reflect changes or conditions approved by the Coordinating Council.
- Non-federal Partners must provide the Deputy Director with an electronic copy of the narrative and either an electronic or hard copy of the budget of the grant application as submitted to the grants agency (e.g. NOAA Grants).
- Federal Partners do not submit applications to NOAA Grants.

9. Operation and/or Leadership Team and Coordinating Council review and final decision with contingencies or emergencies.

Committee(s) review and decide project changes (e.g. scope of work, rescissions, no-cost extensions, returned unused funds, etc.) during the award period.

Proposal Guidance

General Proposal Guidelines

- The Program is predicated upon the most efficient use of available funds. Many jurisdictions have data collection and data management programs which are administered by other fishery management agencies. Detail coordination efforts your agency/Committee has undertaken to demonstrate cost-efficiency and non-duplication of effort.

- All Program Partners conducting projects for implementation of the program standards in their jurisdictions are required to submit data to the Program in prescribed standards, where the module is developed and formats are available. Detail coordination efforts with Program data management staff with projects of a research and/or pilot study nature to submit project information and data for distribution to all Program Partners and archives.

- If appropriate to your project, please detail your agency's data management capability. Include the level of staff support (if any) required to accomplish the proposed work. If contractor services are required, detail the level and costs.

- Before funding will be considered beyond year one of a project, the Partner agency shall detail in writing how the Partner agency plans to assume partial or complete funding or, if not feasible, explain why.

- If appropriate to your project, detail any planned or ongoing outreach initiatives. Provide scope and level of outreach coordinated with either the Program Assistant and/or Deputy Director.

- Proposals including a collection of aging or other biological samples must clarify Partner processing capabilities (i.e., how processed and by whom).

- Provide details on how the proposal will benefit the Program as a whole, outside of benefits to the Partner or Committee.

- Proposals that request funds for law enforcement should confirm that all funds will be allocated towards reporting compliance.

- Proposals must detail any in-kind effort/resources, and if no in-kind resources are included, state why.

- Proposals must meet the same quality as would be appropriate for a grant proposal for ACFCMA or other federal grant.

- Assistance is available from Program staff, or an Operations Committee member for proposal preparation and to insure that Program standards are addressed in the body of a given proposal.

- Even though a large portion of available resources may be allocated to one or more jurisdictions, new systems (including prototypes) will be selected to serve all Partners' needs.

- Partners submitting pilot or other short-term programs are encouraged to lease large capital budget items (vehicles, etc.) and where possible, hire consultants or contractors rather than hire new permanent personnel.

- The Program will not fund proposals that do not meet Program standards. However, in the absence of approved standards, pilot studies may be funded.

- Proposals will be considered for modules that may be fully developed but have not been through the formal approval process. Pilot proposals will be considered in those cases.

- The Operations Committee may contact Partners concerning discrepancies or inconsistencies in any proposal and may recommend modifications to proposals subject to acceptance by the submitting Partner and approval by the Coordinating Council. The Operations Committee may recommend changes or conditions to proposals. The Coordinating Council may conditionally approve proposals. These contingencies will be documented and forwarded to the submitting Partner in writing by Program staff.

- Any proposal submitted after the initial RFP deadline will not be considered, in addition to any proposal submitted by a Partner which is not current with all reporting obligations.

Proposal Format

Applicant Name: Identify the name of the applicant organization(s).

Project Title: A brief statement to identify the project.

Project Type: Identify whether new or maintenance project.

> *New Project – Partner project never funded by the Program. New projects may not exceed a duration of one year.*
>
> *Maintenance Project – Project funded by the Program that conducts the same scope of work as a previously funded new or maintenance project. These proposals may not contain significant changes in scope (e.g., the addition of bycatch data collection to a catch/effort dealer reporting project). PIs must include in the cover letter whether there are any changes in the current proposal from prior years' and, if so, provide a brief summary of those changes. At year 5 of maintenance funding, a project's base funding will be calculated as the average of funding received during the project's four years as a* maintenance *project.*

Requested Award Amount: Provide the total requested amount of proposal. Do not include an estimate of the NOAA grant administration fee.

Requested Award Period: Provide the total time period of the proposed project. The award period typically will be limited to one-year projects.

Objective: Specify succinctly the "why", "what", and "when" of the project.

Need: Specify the need for the project and the association to the Program.

Results and Benefits: Identify and document the results or benefits to be expected from the proposed project. Clearly indicate how the proposed work meets various elements outlined in the ACCSP Proposal Ranking Criteria Document (Appendix B). Some potential benefits may include: fundamental in nature to all fisheries; region-wide in scope; answering or addressing region-wide questions or policy issues; required by MSFCMA, ACFCMA, MMPA, ESA, or other acts; transferability; and/or demonstrate a practical application to the Program.

Data Delivery Plan: Include coordinated method of the data delivery plan to the Program in addition to module data elements gathered. The data delivery plan should include the frequency of data delivery (i.e. monthly, semi-annual, annual) and any coordinate delivery to other relevant partners.

Approach: List all procedures necessary to attain each project objective. If a project includes work in more than one module, identify approximately what proportion of effort is comprised within each module (e.g., catch and effort 45%, biological 30% and bycatch 25%). Please note that only one primary module and one secondary module are considered for ranking.

Geographic Location: The location where the project will be administered and where the scope of the project will be conducted.

Milestone Schedule: An activity schedule in table format for the duration of the project, starting with Month 1 and ending with a three-month report writing period.

Project Accomplishments Measurement: A table showing the project goals and how progress towards those goals will be measured. In some situations the metrics will be numerical such as numbers of anglers contacted, fish measured, and/or otoliths collected, etc.; while in other cases the metrics will be binary such as software tested and software completed. Additional details such as intermediate metrics to achieve overall proposed goals should be included especially if the project seeks additional years of funding.

Cost Summary (Budget): Detail all costs to be incurred in this project in the format outlined in the budget guidance and template at the end of this document. A budget narrative should be included which explains and justifies the expenditures in each category. Provide cost projections for federal and total costs. Provide details on Partner/in-kind contribution (e.g., staff time, facilities, IT support, overhead, etc.). Details should be provided on start-up versus long-term operational costs.

> **In-kind** - [1]Defined as activities that could exist (or could happen) without the grant. [2]In-kind contributions are from the grantee organization. In-kind is typically in the form of the value of personnel, equipment and services, including direct and indirect costs.
>
> [1] The following are generally accepted as in-kind contributions:
>
> i. Personnel time given to the project including state and federal employees
>
> ii. Use of existing state and federal equipment (e.g. data collection and server platforms, Aging equipment, microscopes, boats, vehicles)

Overhead rates may not exceed 25% of total costs unless mandated by law or policy. Program Partners may not be able to control overhead/indirect amounts charged. However, where there is flexibility, the lowest amount of overhead should be charged. When this is accomplished indicate on the 'cost summary' sheet the difference between the overhead that could have been charged and the actual amount charged, if different. If overhead is charged to the Program, it cannot also be listed as in-kind.

Maintenance Projects: Maintenance proposals must provide project history table, description of completed data delivery to the ACCSP and other relevant partners, table of total project cost by year, a summary table of metrics and achieved goals, and the budget narrative from the most recent year's funded proposal.

Principal Investigator: List the principal investigator(s) and attach curriculum vitae (CV) for each. Limit each CV to two pages. Additional information may be requested.

Budget Guidelines & Template

All applications must have a detailed budget narrative explaining and justifying the expenditures by object class. Include in the discussion the requested dollar amounts and how they were derived. A spreadsheet or table detailing expenditures is useful to clarify the costs (see template below). The following are highlights from the NOAA Budget Guidelines document to help Partners formulate their budget narrative. The full Budget Guidelines document is available here.

Object Classes:

Personnel: include salary, wage, and hours committed to project for each person by job title. Identify each individual by name and position, if possible.

Fringe Benefits: should be identified for each individual. Describe in detail if the rate is greater than 35 % of the associated salary.

Travel: all travel costs must be listed here. Provide a detailed breakdown of travel costs for trips over $5,000 or 5 % of the award. Include destination, duration, type of transportation, estimated cost, number of travelers, lodging, mileage rate and estimated number of miles, and per diem.

Equipment: equipment is any single piece of non-expendable, tangible personal property that costs $5,000 or more per unit and has a useful life of more than one year. List each piece of equipment, the unit cost, number of units, and its purpose. Include a lease vs. purchase cost analysis. If there are no lease options available, then state that.

Supplies: purchases less than $5,000 per item are considered by the federal government as supplies. Include a detailed, itemized explanation for total supplies costs over $5,000 or 5% of the award.

Contractual: list each contract or subgrant as a separate item. Provide a detailed cost breakdown and describe products/services to be provided by the contractor. Include a sole source justification, if applicable.

Other: list items, cost, and justification for each expense.

Total direct charges

Indirect charges: If claiming indirect costs, please submit a copy of the current approved negotiated indirect cost agreement. If expired and/or under review, a copy of the transmittal letter that accompanied the indirect cost agreement application is requested.

Totals of direct and indirect charges

Example. Budget narrative should provide further detail on these costs.

Description	Calculation	Cost
Personnel (a)		
Supervisor	Ex: 500 hrs x $20/hr	$10,000
Biologist		
Technician		
Fringe (b)		
Supervisor	Ex: 15% of salary	$1500
Biologist		
Technician		
Travel (c)		
Mileage for sampling trips	Ex: Estimate 2000 miles x $0.33/mile	$660
Travel for meeting		
Equipment (d)		
Boat	Ex: $7000, based on current market research	$7000
Supplies (e)		
Safety supplies		$1200
Sampling supplies		$1000
Laptop computers	2 laptops @$1500 each	$3000
Software		$500
Contractual (f)		
Data Entry Contract	Ex: 1000 hrs x $20/hr	$20,000
Other (h)		
Printing and binding		
Postage		
Telecommunications charges		
Internet Access charges		
Totals		
Total Direct Charges (i)		
Indirect Charges (j)		
Total (sum of Direct and Indirect) (k)		

Post-award Responsibilities

Changing the Scope of Work

Partners shall submit requests for amendments to approved projects in writing to the Deputy Director. The Coordinating Council member for that Partner must sign the request.

When Partners request an amendment to an approved project, the Deputy Director will contact the Chair and Vice Chair of the Operations Committee. The Deputy Director and Operations Committee Chairs will determine if the requested change is minor or substantial. The Chairs and Deputy Director may approve minor changes.

For substantial proposed changes, a decision document including the opinions of the Chairs and the Deputy Director will be sent to the Operations Committee and the ACCSP Leadership Team of the Coordinating Council for review.

The ACCSP Leadership Team will decide to approve or reject the request for change and notify the Deputy Director, who will send a written notification to the Partner's principal investigator with a copy to the Operations Committee.

When a requested major amendment is submitted shortly before a Coordinating Council meeting, the approval of the amendment will be placed on the Council Agenda.

The Deputy Director will notify NOAA Grants of any change in scope of work for final approval for non-federal proposals, and the Partner will need to request a Change in Scope through Grants Online. Necessary communications will be maintained between the concerned Partner, the Program and NOAA Grants. Any changes must be approved through the normal NOAA Grants process.

Requesting a No-cost Extension

If additional time is needed to complete the project, Program Partners can request a no-cost extension to their award period. Partners should let the Program know of the need for additional time and then request the extension as an Award Action Request through NOAA Grants Online at least 30 days before the end date of the award.

Necessary communications will be maintained between the concerned Partner, the Program, and NOAA Grants office. Any changes must be approved through the normal NOAA Grants process.

Declaring Unused/Returned Funds

In an effort to limit the instances in which funds are not completely used during the award period, draw down reports from the NOAA Grants offices indicating remaining grant balances will be periodically reviewed during each fiscal year.

While effort should be made to complete the project as proposed, if Program Partners find that they will not be able to make use of their entire award, they should notify the Program and their NOAA Federal Program Officer as soon as possible. Depending on the timing of the action, the funds may be able to be reused within the Program, or they may have to be returned to the U.S. Treasury.

Program Partners must submit a written document to the Deputy Director outlining unused project funds potentially being returned. The Partner must also notify their Coordinating Council member (if applicable) for approval to return the unused funds. If the funding is available for re-use within the Program, the Director and Deputy Director will confer with the Operations Committee Chair and Vice-Chair and the Advisory Committee Chair, and then submit a written recommendation to the ACCSP Leadership Team of the Coordinating Council for final approval on the plan to distribute the returned money.

Necessary communications will be maintained between the concerned Partner, the Program, and NOAA Grants office. Any changes must be approved through the normal NOAA Grants process.

Reporting Requirements

Program staff will assess project performance.

The Partner project recipients must abide by the NOAA Regional Grant Programs reporting requirements and as listed below. All semi-annual and final reports are to include a table showing progress toward each of the progress goals as defined in Step 2b and additional metrics as appropriate. Also, all Partner project recipients will submit the following reports based on the project start date to the Deputy Director:

- Semi-annual reports (due 30 days after the semi-annual period) throughout the project period including time periods during no-cost extensions,
- One final report (due 90 days after project completion).
- Federal Partners must submit reports to the Deputy Director, and State Partners must submit reports to both the Deputy Director and the appropriate NOAA Grants office.

Program staff will conduct an initial assessment of the final report to ensure the report is complete in terms of reporting requirements. Program staff will serve as technical monitors to review submitted reports. NOAA staff also reviews the reports submitted via Grants Online.

A project approved on behalf of a Program Committee will be required to follow the reporting requirements specified above. The principle investigator (if not the Chair of the Committee) will submit the report(s) to the Chair and Vice Chair of the Committee for review and approval. The Committee Chair is responsible for submitting the required report(s) to the Program.

Joint projects will assign one principle investigator responsible for submitting the required reports. The principle investigator will be identified within the project proposal. The submitted reports should be a collaborative effort between all Partners involved in the joint project.

Project recipients will provide all reports to the Program in electronic format.

Partners who receive no-cost extensions must notify the Deputy Director within 30 days of receiving approval of the extension. Semi-annual and final reports will continue to be required through the extended grant period as previously stated.

Partners that have not met reporting requirements for past/current projects may not submit a new proposal.

A verbal presentation of project results may be requested. Partners will be required to submit copies of project specifications and procedures, software development, etc. to assist other Program Partners with the implementation of similar programs.

Report Format

Semi-Annual(s) – Progress Reports: (3-4 pages)

- Title page - Project name, project dates (semi-annual period covered and complete project period), submitting Partner, and date.
- Objective
- Activities Completed – bulleted list by objective.
- Progress or lack of progress of incomplete activities during the period of semi-annual progress – bulleted list by objective.
- Activities planned during the next reporting period.
- Metrics table
- Milestone Chart – original and revised if changes occurred during the project period.

Final Report:

- Title page – Project name, project dates, submitting Partner, and date.
- Abstract/Executive Summary (including key results)
- Introduction
- Procedures

- Results:
    - Description of data collected.
    - The quality of the data pertaining to the objective of the project (e.g. representative to the scope of the project, quantity collected, etc.).
    - Compiled data results.
    - Summary of statistics.
- Discussion:
    - Discuss the interpretation of results of the project by addressing questions such as, but not limited to:
    - What occurred?
    - What did not occur that was expected to occur?
    - Why did expected results not occur?
    - Applicability of study results to Program goals.
    - Recommendations/Summary/Metrics
- Summarized budget expenditures and deviations (if any).

Programmatic review

Project reports will inform Partners of project outcomes. This will allow the Program as a whole to take advantage of lessons learned and difficulties encountered. Staff will provide final reports to the appropriate Committee(s). The Committees then can discuss the report(s) and make recommendations to modify the Data Collection Standards as appropriate. The recommendations will be submitted through the Program committee(s) review process.

Appendix A: Maximum Funding for Maintenance Projects Entering Year 5 or 6 of Funding in FY23

Projects in Year 5 or 6 of Maintenance Funding	**Calculated Base** (4-year avg)	Maximum Funding Year 5	**Maximum Funding Year 6 (Final Year)**
Advancing Fishery Dependent Data Collection for Black Sea Bass (Cetropristis striata) in the Southern New England and Mid-Atlantic Region Utilizing Modern Technology and a Vessel Research Fleet Approach	**$132,229**	$88,153	

Appendix B: Ranking Criteria Spreadsheet for Maintenance and New Projects

Ranking Guide – Maintenance Projects:

Primary Program Priority	**Point Range**	**Description of Ranking Consideration**
Catch and Effort Biological Sampling Bycatch/Species Interactions Social and Economic	0 – 10 0 – 10 0 – 6 0 – 4	Rank based on range within module and level of sampling defined under Program design. When considering biological, bycatch or recreational funding, rank according priority matrices.
Data Delivery Plan	+ 2	Additional points if a data delivery plan to Program is supplied and defined within the proposal.

Project Quality Factors	**Point Range**	**Description of Ranking Consideration**
Multi-Partner/Regional impact including broad applications	0 – 5	Rank based on the number of Partners involved in project OR regional scope of proposal (e.g. geographic range of the stock).
> yr 2 contains funding transition plan and/or justification for continuance	0 – 4	Rank based on defined funding transition plan away from Program funding or viable justification for continued Program funding.
In-kind contribution	0 – 4	1 = 1% - 25% 2 = 26% - 50% 3 = 51% - 75% 4 = 76% - 99%
Improvement in data quality/quantity/timeliness	0 – 4	1 = Maintain minimum level of needed data collections ↓ 4 = Improvements in data collection reflecting 100% of related module as defined within the Program design. Metadata is provided and defined within proposal if applicable.
Potential secondary module as a by-product (In program priority order)	0 – 3 0 – 3 0 – 3 0 – 1	Ranked based on additional module data collection and level of collection as defined within the Program design of individual module.
Impact on stock assessment	0 – 3	Rank based on the level of data collection that leads to new or greatly improved stock assessments.

Other Factors	Point Range	Description of Ranking Consideration
Properly Prepared	-1 – 1	Meets requirements as specified in funding decision document Step 2b and Guidelines
Merit	0 – 3	Ranked based on subjective worthiness

Ranking Guide – Maintenance Projects: (*to be used only if funding available exceeds total Maintenance funding requested*)

Ranking Factors	Point Range	Description of Ranking Consideration
Achieved Goals	0 – 3	Proposal indicates project has consistently met previous set goals. Current proposal provides project goals and if applicable, intermediate metrics to achieve overall achieved goals.
Data Delivery Plan	0 – 2	Ranked based if a data delivery plan to Program is supplied and defined within the proposal.
Level of Funding	-1 – 1	-1 = Increased funding from previous year 0 = Maintained funding from previous year 1 = Decreased funding from previous year
Properly Prepared	-1 – 1	-1 = Not properly prepared 1 = Properly prepared
Merit	0 – 3	Ranked based on subjective worthiness

Ranking Guide – New Projects:

Primary Program Priority	Point Range	Description of Ranking Consideration
Catch and Effort Biological Sampling Bycatch/Species Interactions Social and Economic	0 – 10 0 – 10 0 – 6 0 – 4	Rank based on range within module and level of sampling defined under Program design. When considering biological, bycatch or recreational funding, rank according priority matrices.
Data Delivery Plan	+ 2	Additional points if a data delivery plan to Program is supplied and defined within the proposal.

Project Quality Factors	Point Range	Description of Ranking Consideration
Multi-Partner/Regional impact including broad applications	0 – 5	Rank based on the number of Partners involved in project OR regional scope of proposal (e.g. fisheries sampled).
Contains funding transition plan / Defined end-point	0 – 4	Rank based on quality of funding transition plan or defined end point.
In-kind contribution	0 – 4	1 = 1% - 25% 2 = 26% - 50% 3 = 51% - 75% 4 = 76% - 99%
Improvement in data quality/quantity/timeliness	0 – 4	1 = Maintain minimum level of needed data collections 4 = Improvements in data collection reflecting 100% of related module as defined within the Program design. Metadata is provided and defined within proposal if applicable.
Potential secondary module as a by-product (In program priority order)	0 – 3 0 – 3 0 – 3 0 – 1	Ranked based on additional module data collection and level of collection as defined within the Program design of individual module.
Impact on stock assessment	0 – 3	Rank based on the level of data collection that leads to new or greatly improved stock assessments.

Other Factors	Point Range	Description of Ranking Consideration
Innovative	0 – 3	Rank based on new technology, methodology, financial savings, etc.
Properly Prepared	-1 – 1	Meets requirements as specified in funding decision document Step 2b and Guidelines
Merit	0 – 3	Ranked based on subjective worthiness

Biological Sampling Priority Matrix

Created in February 2021

For FY2023

Our vision is to be the principal source of fisheries-dependent information on the Atlantic coast through the cooperation of all program partners.

Biological Review Panel Recommends:

- Species in the upper 25% of the priority matrix should be considered for funding.

- Sampling projects which cover multiple species within the upper 25% are highly recommended.

* UPPER 25% OF MATRIX

Biological Review Panel Recommendations Based on Matrix*:

Species	Overfished	Overfishing	Most Recent Stock Assessme	Current/Next Stock Assessment	Council Priority	ASMFC Priority	State Priority	NMFS Priority	Fishery Managed	Sig. change in landings	Sig. change in mgmt w/in 24 mo	Adequacy of level of sampling	Stock Resilience	Seasonality of Fishery	Average Priority	TOTAL
Black Sea Bass *Centropristis striata*	N: MA N:SA	N: MA N:SA	MA: 2019 SA: 2018	MA:2021 SA:2023	5.0	5	3.5	5.0	5	1	1	4	3	1	4.5	32.43
Red Grouper *Epinephelus morio*	Y	Y	2017	2023	5.0	0	1.1	5.0	3	1	4	3	4	3	2.8	32.14
Snowy Grouper *Epinephelus niveatus*	Y	N	2019	2021	5.0	0	0.9	5.0	3	3	1	3	5	3	2.8	30.14
Bluefin Tuna *Thunnus thynnus*	U	N	2017	2021	0.0	0	1.8	5.0	5	5	5	3	3	1	2.0	30.14
River Herring *Alosa*	D	U	2017	2023	0.0	4	3.6	0.0	5	3	1	4	4	4	2.3	30.00
Cobia *Rachycentron canadum*	N	N	2020		1.0	5	1.5	4.0	3	1	3	4	3	3	3.1	29.86
Tilefish *Lopholatilus*	N: MA N:SA	N: MA Y:SA	MA:2017 SA:2016	MA/SA:2021	5.0	0	1.9	4.0	5	1	1	3	4	3	2.8	29.71
American Shad *Alosa*	D	U	2020		0.0	3	3.8	0.0	5	3	1	4	5	3	2.2	29.21
Atlantic halibut *Hippoglossus*	U	U	2020		4.0	0	1.2	1.0	3	5	1	4	5	3	2.0	28.71
Atlantic Menhaden *Brevoortia tyrannus*	N	N	2020	2022	0.0	5	3.1	3.0	5	1	3	3	3	1	2.8	28.64
Gray Triggerfish *Balistes capriscus*	U	U			5.0	0	1.0	4.0	3	5	1	3	2	3	2.6	28.36
Atlantic Smooth Dogfish *Mustelus canis*	N	N	2015	2021	0.0	3	1.4	3.0	5	5	1	3	2	3	2.1	28.21
Ocean Pout *Macrozoarces americanus*	Y	N	2020		0.0	0	0.2	0.0	3	5	5	5	5	3	1.0	27.79
Spanish Mackerel *Scomberomorus*	N	N	2020	2022	5.0	2	1.2	4.0	3	1	2	3	2	3	3.0	27.50
Blueline Tilefish *Caulolatilus microps*	U	U	2017	2024	3.0	0	1.1	5.0	3	3	2	3	3	3	2.4	27.29
Sandbar Shark *Carcharhinus plumbeus*	Y	N	2017		0.0	1	1.1	5.0	5	5	1	2	3	3	1.8	27.21
American Eel *Anguilla rostrata*	D	U	2017	2022	0.0	5	3.5	0.0	5	1	1	4	5	1	2.5	27.21
Gag Grouper *Mycteroperca microlepis*	N	N	2014	2021	5.0	0	0.9	5.0	3	1	0	3	4	3	2.8	26.57
Red Snapper *Lutjanus campechanus*	Y	Y	2016	2021	5.0		0.6	5.0	3	1	1	1	5	3	2.9	26.57
Dolphin *Coryphaena hippurus*	U	U			5.0	0	1.1	4.0	5	3	0	4	1	1	2.8	26.43
Horseshoe Crab *Limulus polyphemus*	U	U	2019	2021	0.0	4	3.1	0.0	5	3	0	3	4	2	2.0	26.00
Scamp *Mycteroperca phenax*	U	U		2022	5.0	0	1.0	4.0	3	1	0	3	4	3	2.6	25.93
Winter Skate *Raja ocellata*	N	N	2019	2023	0.0	0	1.0	0.0	3	5	5	4	5	1	1.0	25.36
Spiny Dogfish *Squalus acanthias*	N	N	2018	2022	0.0	3	2.6	2.0	5	3	0	2	5	1	1.9	24.93

Bio-sampling Priority Matrix

- Grouping of species in upper 25% of total matrix score, based on sampling adequacy and average priority (average of ASMFC, Council, NMFS and State priorities).
- Projects that target multiple upper quartile species should be given a higher priority.

		Biological Sampling Adequacy	
		Adequate (0 - 2)	Inadequate (3 - 5)
Averaged Priority Columns	High (≥ 3.0)		Black Sea Bass - Bluefin Tuna
	Low (< 3.0)	River Herring - Tilefish	Red Grouper - Snowy Grouper - Cobia - American Shad - Atlantic Halibut - Atlantic Menhaden - Atlantic Smooth Dogfish - Gray Triggerfish - Oceanpout - Spanish Mackerel - Blueline Tilefish - Sandbar Shark - Gag Grouper - American Eel - Red Snapper - Dolphin - Horseshoe Crab - Scamp - Winter Skate - Spiny Dogfish

Bycatch Sampling Priority Matrix

Created in February 2021

For FY 2023

Our vision is to be the principal source of fisheries-dependent information on the Atlantic coast through the cooperation of all program partners.

Top Quartile of Bycatch Matrix Suggestions

Combined Fleets	Sig. Change in mgmt w/in past 36 mo	Amt of reg discards	Amt of non reg discards	Prot Spp Interactions	Score
Mid-Atlantic Gillnet	3	4	2	5	14
Mid-Atlantic Pound Net	1	4	2	5	12
american american lobster Pots	1	4	1	5	11
american american lobster Pots	1	4	1	5	11
Snapper grouper H&L Fleet	3	4	1	3	11
New England Extra-Large-Mesh Gillnet	0	4	2	5	11
Mid-Atlantic Small-Mesh Otter Trawl, Bottom	1	4	1	5	11
Mid-Atlantic Fish Pots and Traps	1	4	1	5	11
South Atlantic Large Mesh Gillnet	0	4	2	5	11
Southeastern, Atlantic and Gulf of Mexico HMS Pelagic Longline	1	4	1	5	11
New England Crab Pots	3	2	1	5	11
South Atlantic shrimp Trawl	1	4	2	3	10
New England Otter Trawl	1	4	2	3	10
Southeastern, Atlantic and Gulf of Mexico HMS Shark Bottom Longline	0	4	1	5	10
Pelagic H&L Fleet (North)	1	4	1	3	9
Mid-Atlantic Extra-Large-Mesh Gillnet	1	2	1	5	9
New England Gillnet	1	2	1	5	9
South Atlantic Skimmer shrimp Trawl	3	2	1	3	9

Atlantic Coastal Cooperative Statistics Program
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ACCSP Funding Prioritization of the Recreational Technical Committee

July 2017

The Recreational Technical Committee sets the recreational data collection priorities for inclusion in ACCSP's annual request for proposals (RFP). In 2017, the committee opted to use its Atlantic Coast Recreational Implementation Plan priorities as the recreational data priorities for ACCSP's annual funding process. The prioritized list of data needs, which were reviewed and approved by the ACCSP Coordinating Council, is provided below:

1. **Improve precision (PSE) of MRIP catch estimates**
2. **(t) Comprehensive for-hire data collection and monitoring**
2. **(t) Improved recreational fishery discard and release data**
4. **Biological sampling for recreational fisheries separate from MRIP APAIS**
5. **Improved spatial resolution and technical guidance for post-stratification of MRIP estimates**
6. **Improved timeliness of recreational catch and harvest estimates**

SOCIOLOGICAL AND ECONOMIC DATA

The Committee on Economics and Social Sciences (CESS) developed a list of priority socioeconomic data elements for coastwide collection. The list is not exhaustive; it represents key elements that can serve as a baseline of fundamental socioeconomic information to support management decisions. The list of priority data elements includes:

1. Trip-level information (to be collected through voluntary or mandatory reporting, for all or a subset of participants)
2. Data elements for an owner/operator survey (to be collected through an annual or semiannual survey)*

The CESS identified these priority data elements with the understanding that data would be collected in the aforementioned methods and would be linked to other ACCSP data through identifiers. Alternative collection methods or the inability to link data with identifiers may require changes to the priority data elements list in order to ensure the utility of the data.

Note: Priorities for standalone surveys will differ from the priorities identified below due to their distinct methodologies and inability to leverage other ACCSP data. The CESS should be consulted when identifying data elements for standalone socioeconomic surveys to ensure their utility and, where practical, consistency across studies.

*The ACCSP recognizes the analytic value of collecting the data elements below. We recommend that partners be aware of and take into account the reporting burden to industry, the sensitivity and at times confidentiality of socioeconomic information, and other relevant perspectives when determining which data elements to collect and set as optional or mandatory.

A. COMMERCIAL FISHERIES

Table 1:
TRIP LEVEL INFORMATION

DATA ELEMENT	DESCRIPTION / CRITERIA
Trip Information	
Vessel Identifier	-Unique vessel identifier (e.g., US Coast Guard, state registration number, etc.) -These identifiers must be trackable through time and space.
Trip Identifier	- Unique identifier assigned to the trip
Labor Cost Information	
Total Crew Cost	- Total monetary amount that was given to the crew for this trip

Total Captain Cost (If other than owner)	- Total monetary amount that was given to the captain for this trip
Owner Share	- Total monetary amount the vessel (or permit) owner received for this trip
Other Trip Cost Information	
Fuel & Oil Costs	- Cost for all fuel and oil used on this trip
Bait Costs	- Cost for all bait used on this trip
Ice Costs	- Cost for all ice used on this trip
Grocery Costs	- Cost for all groceries used on this trip
Miscellaneous Costs	- Cost of any other expenses specific to this trip (not including wages, overhead, or fixed costs) E.g., offloading/non-crew labor costs, packaging costs, etc.

Table 2:
DATA ELEMENTS FOR OWNER/OPERATOR SURVEY

DATA ELEMENT	DESCRIPTION / CRITERIA
Vessel Identification*	-Unique vessel identifier (e.g., US Coast Guard, state registration number, etc.) -These identifiers must be trackable through time and space.
Fishermen Identification	-Unique ACCSP Identifier for fishermen
Labor Cost Information	
Crew Payment System	- Code to identify crew & captain payment system (e.g. share system, per day, per trip)
Percentage Share Crew	- Percentage share to crew (if applicable)
Percentage Share Captain	- Percentage share to captain (if applicable)
Percentage Share Boat/Owner	- Percentage share to boat/owner (if applicable)
Crew Wages	- Average crew wages for the year (crew payment system indicates whether by hour, trip, day, etc.) (if applicable)
Captain Wages	- Average captain wages for the year (crew payment system indicates whether by hour, trip, day, etc.) (if applicable)
Annual Costs (Most Recent Year)	
Labor costs (captain and crew not in household)	- Total costs of labor for captain and crew outside the owner/operator's household
Labor costs (to people within owner/operator household)	- Total costs of labor for captain and crew within the owner/operator's household
Annual Insurance Costs	- Hull, health, protection and indemnity, mortgage, etc.
Dockage	- Total cost for vessel dockage, home port and transient dockage
Loan Payments	- Principal and interest
New Gear/ Equipment	- Total cost of new gear or equipment acquired
Repairs & Maintenance	- Total cost of repairs & maintenance of vessel and gear that were conducted in the previous year
Permits & Licenses	- Total cost of fishing permits / licenses for the previous year

Leased Quota Cost	- Total cost of leased quota for the previous year
Other Professional Expenses	- Professional expenses not otherwise itemized
Demographic Information	
Household Size	- # of individuals in the household (including respondent)
Employment Status	- Current employment status (e.g., employed fulltime, part-time, unemployed, retired, etc.)
Education	- Highest level of education completed
Marital/Cohabitational Status	- Current marital or cohabitational status of respondent
Age	- Age of the respondent
Gender	- Gender of the respondent
Ethnicity	- Ethnic background
Total Annual Household Income	- Total annual household income
Number of Household Individuals Involved in Commercial Fishing	-Total number of household individuals involved in commercial fishing (including respondent)
Percent of Annual Household Income from Commercial Fishing	- Percent of household income that is generated through commercial fishing or support activities
County of Residence	-County of residence
Years in Community	- Years in county of residence
Fishing Activity Information	
Fishermen status	-Fishermen status (e.g. full time, part time, not actively fishing)
Years in Commercial Fishing	- Number of years participating in commercial fishery
Permits held	- fishing permits held (by permit type)
Permit use	- Were all permits used within the last year
Reason for Latency	-Reason for not using permit within the last year
Primary Species Landed by Month	- Primary species landed by month
Primary Gears Used by Month	- Primary gears used by month

*Vessel Identifier is needed to link trip-level data to survey results

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This list includes dates for fiscal year 2022, including ACCSP committee meetings, relevant dates of the funding cycle, as well as meetings or conferences ACCSP typically attends or which may be of interest to our partners. If you have any questions or comments on this calendar please do not hesitate to contact the ACCSP staff at info@accsp.org.

Feb 1-3:	NEFMC Meeting – Portsmouth, NH
Feb 7:	Recreational Technical Committee – Webinar
Feb 8-10:	MAFMC Meeting – Durham, NC
Feb 9:	Biological Review Panel Annual Meeting – Webinar
Feb 9:	Bycatch Prioritization Committee Annual Meeting –Webinar
Feb 22:	Atlantic Coast FHTS Training– Webinar
Feb 23-24:	Atlantic Coast APAIS Training– Webinar
Mar 1:	Start of ACCSP FY22
Mar 2:	Information Systems Committee Annual Meeting – Webinar
Mar 3:	Commercial Technical Committee Annual Meeting – Webinar
Mar 7-11:	SAFMC Meeting – Jekyll Island, GA
Apr 5-7:	MAFMC Meeting – Galloway, NJ
Apr 12-14:	NEFMC Meeting – Mystic, CT
Week of April 11:	Operations and Advisory Committees Spring Meeting – Webinar
Week of April 11:	Recreational Technical Committee – Webinar
May 2-5:	ASMFC/Coordinating Council Meeting – Arlington, VA
May 11:	ACCSP issues request for proposals
Late May:	APAIS Wave 2 Meeting – Webinar
Jun 7-9:	MAFMC Meeting – Riverhead, NY
Jun 13-17:	SAFMC Meeting – Key West, FL
Jun 15:	Initial proposals are due
Jun 22:	Initial proposals are distributed to Operations and Advisory Committees
Jun 28-30:	NEFMC Meeting – Portland, ME
July 6:	Any initial written comments on proposals due
Week of Jul 11:	Review of initial proposals by Operations and Advisory Committees – Webinar
July 20:	If applicable, any revised written comments due
Week of Jul 25:	Feedback submitted to principal investigators
Late July:	APAIS Wave 3 Meeting – Webinar
Aug 1-4:	ASMFC Meeting/Coordinating Council Meeting – Arlington, VA

Aug 8-11:	MAFMC Meeting – Philadelphia, PA
Aug 17:	Revised proposals due
Aug 24:	Revised proposals distributed to Operations and Advisory Committees
Week of Sep 5:	Preliminary ranking exercise for Advisors and Operations Members – Webinar
Sep 12-16:	SAFMC Meeting – Charleston, SC
Sep 20-21:	Annual Advisors/Operations Committee Joint Meeting (in-person; location TBD)
Sep 27-29:	NEFMC Meeting – Gloucester, MA
Late October:	APAIS Wave 4 Meeting – Webinar
Oct 4-6:	MAFMC Meeting – Dewey Beach, DE
Oct 19-21:	ASMFC Annual Meeting/Coordinating Council Meeting – Webinar
Dec 5-9:	SAFMC Meeting – Wrightsville Beach, NC
Dec 6-8:	NEFMC Meeting – Newport, RI
Dec 12-15:	MAFMC Meeting – Annapolis, MD

Ranking Guide - Maintenance Projects:

Primary Program Priority	**Point Range**	**Description of ranking consideration**
Catch and Effort	0-10	Rank based on range within module and level of sampling defined under Program design. When considering biological or bycatch funding rank according to priority matrices.
Biological Sampling	0-8	
Bycatch/Species Interactions	0-6	
Social and Economic	0-4	
Metadata	+2	Additional points if metadata collected and supplied to Program defined within the proposal.

Project Quality Factors	**Point Range**	**Description of ranking consideration**
Multi-Partner/Regional impact including broad applications.	0-5	Rank based on the number of Partners involved in project OR regional scope of proposal (e.g. geographic range of the stock).
> yr 2 contains funding transition plan and/or justification for continuance	0-4	Rank based on defined funding transition plan away from Program funding or viable justification for continued Program funding.
In-kind contribution	0-4	1=1%-25% 2=26%-50% 3=51%-75% 4=76%-99%
Improvement in data quality/quantity/timeliness	0-4	1=Maintain minimum level of needed data collections. ↓ 4=Improvements in data collection reflecting 100% of related module as defined within the Program design.
Potential secondary module as a by-product (In program priority order)	0-4, 0-3, 0-2, 0-1	Rank based on single additional module data collection and level of collection as defined within the Program design of individual module.
Impact on stock assessment	0-3	Rank based on the level of data collection that leads to new or greatly improved stock assessments.

Other Factors	**Point Range**	**Description of ranking consideration**
Properly Prepared	0-5	Meets requirements as specified in funding decision document Step2b and Guidelines

Ranking Guide - New Projects:

Program Priority	Point Range	Description of ranking consideration
Catch and Effort	0-10	Rank based on range within module and level of sampling defined under Program design. When considering biological or bycatch funding rank according to priority matrices.
Biological Sampling	0-8	
Bycatch/Species Interactions	0-6	
Social and Economic	0-4	
Metadata	+2	Additional points if metadata collected and supplied to Program defined within the proposal.

Project Quality Factors	Point Range	Description of ranking consideration
Multi-Partner/Regional impact including broad applications.	0-5	Rank based on the number of Partners involved in project or regional scope of proposal (e.g. fisheries sampled).
Contains funding transition plan / Defined end-point	0-4	Rank based on quality of funding transition plan or defined end point.
In-kind contribution	0-4	1=1%-25% 2=26%-50% 3=51%-75% 4=76%-99%
Improvement in data quality/quantity/timeliness	0-4	1=Maintain minimum level of needed data collections. ↓ 4=Improvements in data collection reflecting 100% of related module as defined within the Program design.
Potential secondary module as a by-product (In program priority order)	0-4, 0-3, 0-2, 0-1	Rank based on single additional module data collection and level of collection as defined within the Program design of individual module.
Innovative	0-5	Rank based on new technology, methodology, financial savings, etc.
Impact on stock assessment	0-3	Rank based on the level of data collection that leads to new or greatly improved stock assessments.

Other Factors	Point Range	Description of ranking consideration
Properly Prepared	0-5	Meets requirements as specified in funding decision document Step2b and Guidelines

Atlantic Coastal Cooperative Statistics Program

2022 Data Accountability Report

Vision: To be the principal source of fisheries-dependent information on the Atlantic coast through cooperation of all program partners

Prepared by the
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ACKNOWLEDGEMENTS

The Data Accountability Work Group would like to thank everyone who participated in the surveys and provided feedback during this project. Additionally, thanks are extended to the members of the Commercial Technical Committee who provided feedback on this report.

EXECUTIVE SUMMARY

A Data Accountability Work Group (AWG) was formed in 2020 to address several tasks from the Atlantic Coastal Cooperative Statistics Program (ACCSP) Coordinating Council in regard to fisheries data quality, accountability, verification, and use for the US Atlantic Coast. The AWG was tasked with evaluating the practices and procedures currently in use and reviewing and updating the ACCSP standards as needed. The AWG established the goals of defining data accountability, inventorying and evaluating current practices and procedures, defining the gaps between provided data and data needed by consumers, and documenting and developing best practices. For the purposes of this report, data accountability was defined as fisheries data that included some QA/QC procedure and was complete, accurate, accessible, trusted, and timely. Additionally, accountability meant that uncertainty in data is acknowledged and defined and metadata is documented and available.

The AWG circulated two surveys, in addition to an original survey circulated by ACCSP staff, to meet several of the listed objectives. The first survey was to establish methods in use by partner agencies, the second was for data managers, and the third was for data consumers. The results of these surveys were compiled and described in detail in this report. The three primary validation methods in use are audits, dealer and fishermen report comparisons, and negative reporting. In general, data managers are aware of a variety of issues affecting data quality. This varies by jurisdiction and sector, but the impacts to data quality and the inadequate communication of such impacts are substantial, particularly when working with regional or coastal datasets that span multiple jurisdictions. The responses to the data consumer survey helped identify several issues, most of which were likely communication and not data issues.

Based on comments collected from data managers and consumers and the discussion within the AWG, a number of recommendations are proposed to improve communication of data limitations and provide opportunities for jurisdictions and sectors to expand and streamline processes.

- Begin a multijurisdictional effort to document metadata and caveats to be easily interpreted similarly by all data consumers.
- Create a regular and ongoing Best Practices Workshop to discuss and share automation and technical advances that improve data quality.
- Consider a Best Practices Workshop as part of Fisheries Information System (FIS) projects for fiscal year 2023 for data providers to compare data collection programs, audits, and trips/dealer reports.
- Work with ACCSP to develop automated auditing and data validation tools, particularly for their data entry tools, but also for any data validations conducted by partners.
- Identify and share funding resources for development and implementation of technological advances.
- Develop a Frequently Asked Questions (FAQ) document to increase communication and outreach to data users.

- ACCSP and data providers should review data element/field definitions to make sure they are as comprehensive as possible, including indicating the reliability of each field, and consider including data definitions as part of the data download as a tab or a row.
- Expand and simplify the language on the ACCSP website to better describe the federal laws regarding data confidentiality and data sources and possible affects that may have on a data query.
- Continue the communication between ACCSP and Atlantic States Marine Fisheries Commission (ASMFC) staff and among state and federal partners about data timing for stock assessments, management documents, and compliance reports.

The AWG successfully achieved all of its original objectives with the exception of the development of best practices. Instead, the AWG made several recommendations about coordinating a series of best practices workshops among data providers to accomplish this task.

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1 BACKGROUND

1.1 Charge from Coordinating Council

The idea of accountability was first raised during the May 1, 2018, meeting of the Atlantic Coastal Cooperative Statistics Program (ACCSP) Coordinating Council by the Chair at the time, Lynn Fegley (Maryland Department of Natural Resources). The concept was based on a forward thinking approach toward data quality and maximizing the value of the investment of ACCSP and partner staff time and resources in data warehousing. The idea of data accountability was to have a standardized mechanism or approach to verify that data reflect what is happening on the water and at the docks. The Council felt that data clerks entering paper data provided an initial check of data. While there are advantages to the shift to electronic forms, the loss of the data entry clerk presents a need for additional data verification and auditing. The group consensus was to pass this charge to ACCSP staff, who performed the initial data accountability survey and passed on the charge to the ACCSP Commercial Technical Committee (ComTech).

1.2 Commercial Technical Committee Discussion

ComTech was presented with the results of the Data Accountability Survey (Appendix A) and the charge from the Coordinating Council from their March 12, 2019 meeting. The group discussed the need to define audit and validation. Discussion was held concerning partner resources to meet standards and the differences in various stock assessment approaches. The group members decided that a small group of state and federal partners should be formed to address the definition issues and address the tasks related to the charge from the Coordinating Council.

The Data Accountability Work Group (AWG) members found that the charge from the Coordinating Council was not specific enough to direct work and asked that ACCSP staff coordinate with Coordinating Council members and provide a more specific charge. The following was established and passed on to the AWG.

> ***Problem****: Data validation and accountability issues can compromise data quality and reduce their utility for stock assessments, compliance reports, and other management activities.*
>
> *1. Data validation – How are Partners validating data? Are there potential impacts for data use?*
>
> *2. Data accountability - Does ACCSP receive data in a timely way? Are there gaps that could be closed by better coordination?*
>
> ***Solution****: Direct Commercial Technical committee to…*
>
> *1. Evaluate current validation practices used by the Program Partners.*
>
> *2. Evaluate current procedures for providing/updating data for various uses (stock assessments/compliance reports/FMPs)*

3. Review Atlantic Coast Data Standards and updated as needed to reflect current best practices for both data validation and provisioning.

1.3 AWG Objectives

The AWG held their first meeting on January 17, 2020, and established monthly meetings. The objectives of the AWG were to:

1. Define accountability.
2. Inventory current practices and procedures.
3. Define the gaps between provided data and data needed for science and management.
4. Evaluate the practices and procedures.
5. Document and develop best practices.

1.4 Accountability Definition

The AWG discussed internally what "accountability" meant among the different interest groups for fisheries data, e.g., the Coordinating Council, Atlantic States Marine Fisheries Commission (ASMFC) and Regional Council staff, Agency leadership, NGOs, academia, general public. The definition for the purpose of this project applies to agencies that collect, audit, and/or process data as well as to stakeholders, the public, and data users. The AWG agreed that data accountability meant data integrity where fisheries data included some quality assurance/quality control (QA/QC) procedure and was complete, accurate, accessible, trusted, and timely. Additionally, accountability meant that uncertainty in and limitations of data are acknowledged and defined and metadata is documented and available.

1.5 Survey Development

The original survey was developed by ACCSP staff in response to the charge from the Coordinating Council prior to the formation of the AWG (Section 2). The results of this survey served as a basis for understanding the various approaches used by partners to address accountability. However, it was realized that the broader nature of the original survey did not address the more detailed approaches and did not provide clear enough definitions of some procedures to adequately determine their use across partners. Additionally, the AWG recognized the need to identify the gap between current practices and the definition of accountability established by the group as their first task. Two additional surveys were developed in order to address these knowledge gaps. The Data Manager Survey (Section 3) was focused on collecting information on the current practices and procedures in use and the perspectives of the data managers. The Data Consumer Survey (Section 4) was directed at scientists, managers, and the public. The survey collected information on the successes and deficiencies of current data preparation and dissemination as it relates to accountability as defined by the AWG. The data collected in these two surveys, in addition to the background and groundwork of the first survey and the establishment of an accountability definition, provided

enough information for the AWG to perform an evaluation and make recommendations. See Figure 1 for a summary of the process.

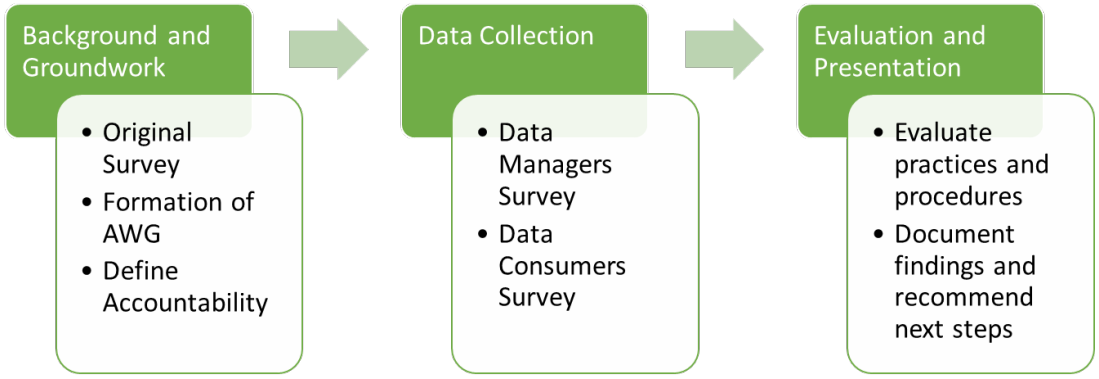

Figure 1. Summary of Data Accountability Work Group process.

2 DATA ACCOUNTABILITY SURVEY

2.1 Background

The Data Accountability Survey was circulated in January, 2019, to partner data contacts and members of the ComTech. This initial survey asked respondents if their agency used each of 12 identified accountability measures and, if yes, to describe how the measure was implemented and what percentage of data are covered. The purpose was to establish basic information on accountability and the survey was distributed prior to the formal formation of the Accountability Work Group (AWG). See Appendix A for a full list of the survey questions.

2.2 Results

This section summarizes the results of original survey by question and discusses suggestions from the AWG to address the issues identified.

2.2.1 Demographics

Nineteen individuals representing 18 agencies responded to the survey. The responses were well distributed along the coast and represented both state and NOAA Fisheries partners (Figure 2).

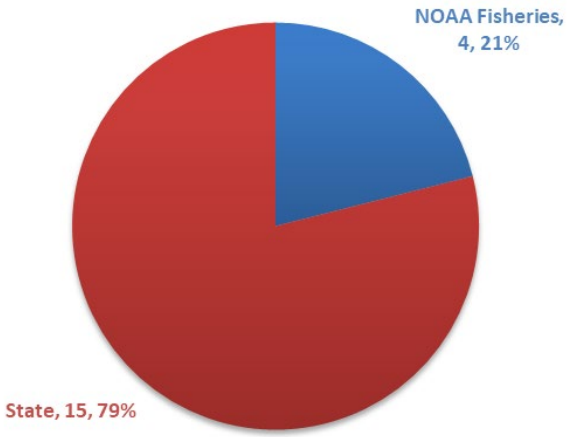

Figure 2. What agency do you represent? Responses were categorized into state and NOAA Fisheries (federal).

2.2.2 Does your agency use onboard observers to validate trip data?

Most respondents indicated that they do not use observers to validate trip data (Figure 3). The AWG observed that all 3 affirmative answers were from federal respondents. In the comments, there were a few states that indicated that, while they do have an observer program, those data are not used to validate the landings. However, the respondents indicated that they do collect biological data, and all data are used to inform management and support stock assessments.

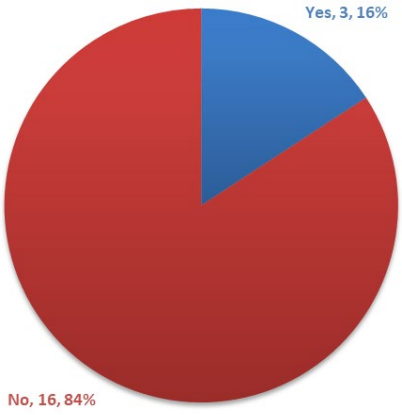

Figure 3. Does your agency use onboard observers to validate trip data?

2.2.3 Does your agency use dockside monitoring/sampling to validate landings data?

Approximately half of the participants in the survey (47%) indicated that dockside sampling data are used to validate landings (Figure 4). All of the partners that responded in the negative

were states, many of which noted in the comments that, while their agency or an associated law enforcement agency do perform dockside sampling/monitoring, those data are not being used to validate landings. This sampling is specifically geared toward biological sampling, bycatch monitoring, and/or law enforcement and is not designed to validate landings.

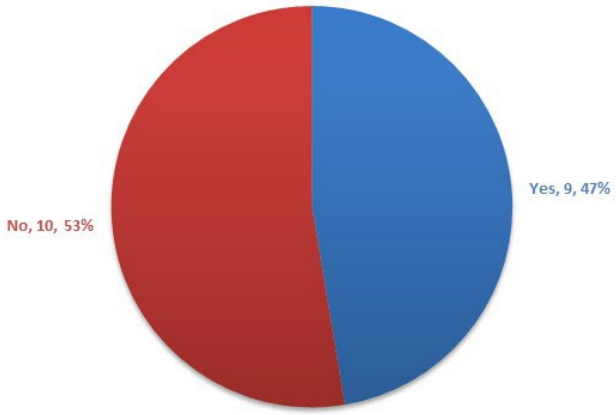

Figure 4. Does your agency use dockside monitoring/sampling to validate landings data?

2.2.4 Does your agency compare fishermen trips to dealer reports to validate landings data?

The majority of responders indicated that that comparison of multiple data streams was used to validate landings data (84%; Figure 5). Among the three responders that responded "No," indicating this method of validation was not used, all three were state agencies. Responses from these states indicated that a comparison was not used as a validation tool due to use of a one-ticket system or a lack of trip level information from either the fishermen or the dealer. Aside from data audits, which are reviewed in Section 2.2.9, the comparison of dealer reports to validate landings data was the most common form of accountability measure being employed by respondents. It is important to note that the responses to this question indicate that the comparison or matching of dealer reports to fishermen reports is more difficult at the state level. Many states indicated that while comparisons do occur, they are not comprehensive and, in some cases, are limited to a single species or fleet.

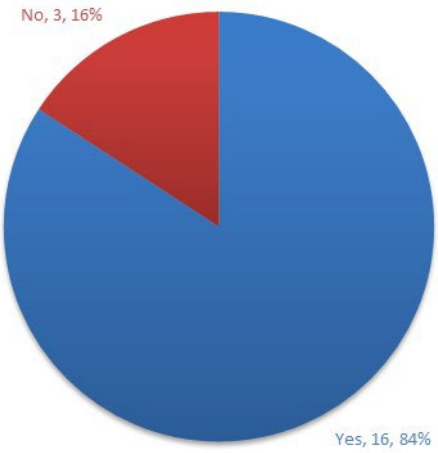

Figure 5. Does your agency compare fishermen trips to dealer reports to validate landings data?

2.2.5 Does your agency conduct interagency comparisons to validate landings data (i.e., comparing a state report to a federal VTR)?

Interagency comparisons to validate landings data are employed by over half of respondents (63%; Figure 6). The AWG observed that a number of the yes responses to this question are comparisons between fishermen trips and dealer reports, which is a positive response to the previous question and two streams of data rather than duplicative streams of data. Highly Migratory Species (HMS) was the only federal partner that does extensive comparison to state data reported in the ACCSP Data Warehouse. In many cases, there were not two data streams to compare as duplicative data reported to multiple jurisdictions are discouraged due to the burden on the industry.

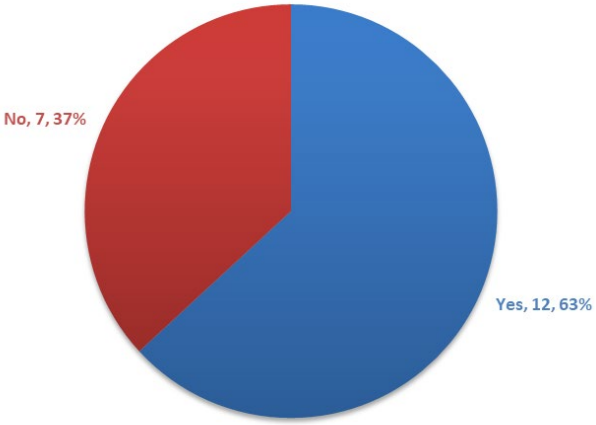

Figure 6. Does your agency conduct interagency comparisons to validate landings data (i.e., comparing a state report to a federal VTR)?

2.2.6 Does your agency use VMS to validate reported trip data?

Most respondents indicated that vessel monitoring system (VMS) is not used to validate trip data (74%; Figure 7). The majority of positive respondents were federal and almost all indicated that the VMS data were used on a portion of landings rather than as a comprehensive approach. It should be noted that with the exception of some pilot projects that are currently underway, all VMS is currently federal.

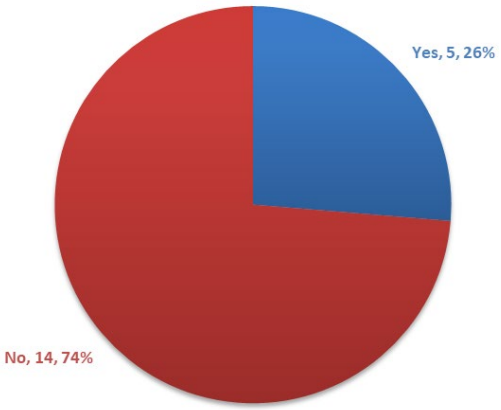

Figure 7. Does your agency use VMS to validate reported trip data?

2.2.7 Does your agency require pre-trip notifications or hail outs to validate landings data?

Slightly under half of respondents to the survey indicated the use of pre-trip notifications or hail outs to validate landings data (47%; Figure 8). The AWG noted that pre-trip notifications or hail outs are more predominantly used at the federal level and that they are not comprehensive in all cases at both the state and federal levels.

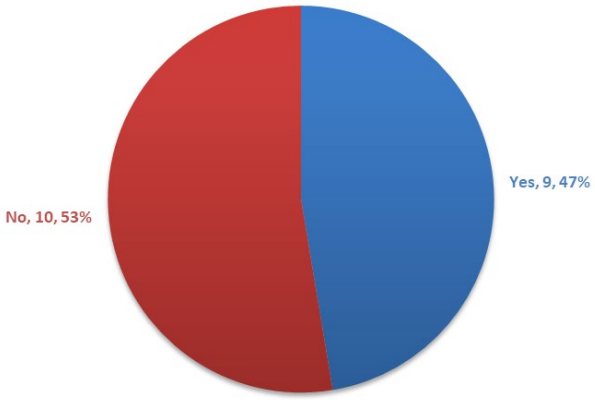

Figure 8. Does your agency require pre-trip notifications or hail outs to validate landings data?

2.2.8 Does your agency require negative trip reports?

Negative trip reports are the third most popular form of accountability measure in the survey, with 79% responding in the affirmative (Figure 9). The AWG noted that numerous states were using negative reports because timely and reliable matching of dealer and fishermen trips was not available at the state level. In addition, it was observed that Greater Atlantic Regional Fisheries Office (GARFO) decided to drop negative reporting, but that they have quite a robust and timely system for matching dealer and fishermen reports. The responses to this question, in conjunction with Section 2.2.4 demonstrate that the two primary approaches to accountability are employed differently at the state and federal level.

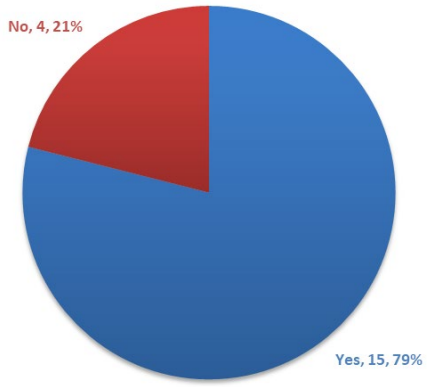

Figure 9. Does your agency require negative trip reports?

2.2.9 Does your agency conduct data audits?

The conduct of data audits was the most popular accountability method amongst those surveyed with 89% of respondents answering in the affirmative (Figure 10). The AWG noted that there was a wide variety of responses in the comments portion of this question indicating that the two negative responses to this question were due to the interpretation of the word “audit.” Two conclusions were drawn from these responses. First, the group became aware of the need to provide definitions for both “audit" and “accountability” during future surveys. Second, the variation in audits and the realization that, in fact, all partners are performing some sort of audit makes this the most employed and difficult method to standardize. Variance in audit procedures and policies stems from the specific needs of the partner and dissimilarity may not necessarily be a negative.

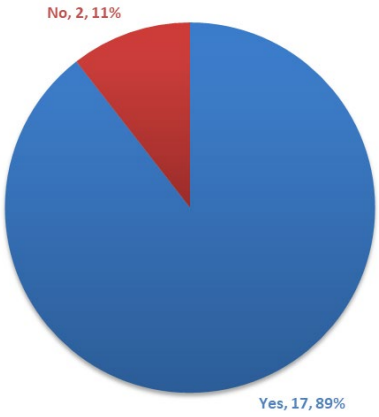

Figure 10. Does your agency conduct data audits?

2.2.10 Does your agency use law enforcement to validate landings data (i.e., boardings/inspections by Natural Resources Police)?

While over half (58%) of respondents indicated the use of law enforcement to validate landings (Figure 11), the AWG observed that the comments indicate that this method is rarely employed in a comprehensive fashion. Use of law enforcement is in many cases limited to certain species or fleets. It was also reported that law enforcement in some agencies did not have access to landings data and so validation was only done upon request or when a vessel or fisher was intercepted for violations.

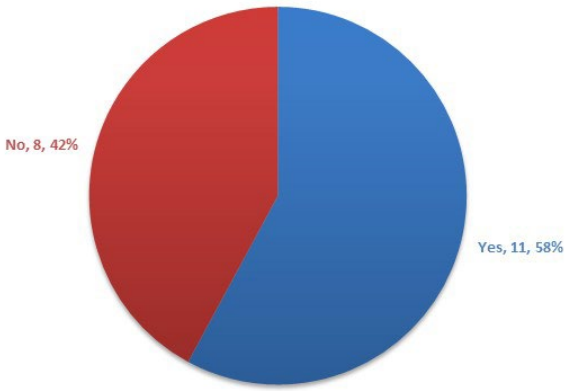

Figure 11. Does your agency use law enforcement to validate landings data (i.e., boardings/inspections by Natural Resources Police)?

2.2.11 Please briefly describe any validation methods used by your agency that were not previously included. Briefly explain your process, the percentage of landings data covered by this method, and how you resolve any data discrepancies.

Approximately a third (32%) of respondents provided an answer to this question that described an additional method (Figure 12). These methods included species specific reviews of data for stock assessment or management purposes, weigh stations, weight out sheets, quota monitoring, and validations built into electronic reporting (ER) software. This last was specifically reported as SAFIS eTRIPS software, but the group recognizes that the majority of ER software includes some validation. Additionally, it was noted that limited landing times were employed to increase the opportunity for law enforcement validation. As this validation was surveyed, this was considered valuable information, but not as an additional method.

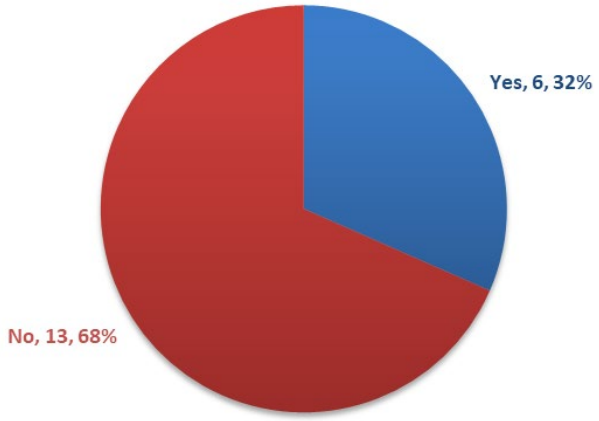

Figure 12. Please briefly describe any validation methods used by your agency that were not previously included. "Yes" indicates a response that provided a methodology not surveyed in a previous question.

2.3 Conclusions and Recommendations

Overall, the AWG found that the responses to the data user survey helped identify the primary methods of accountability that were being employed on the Atlantic coast. The information collected allowed the group to create a definition for accountability and provide clarity for respondents during the following two surveys. The recommendations from this survey were limited as its purpose was to serve as a foundation. Primarily, it helped to identify those methods that have differing patterns of use in state and federal partners due to differences in resources and/or specific constraints of the data. Specifically, the group was able to determine that the top three methods of accountability in use on the Atlantic coast were, in order, audits, comparison of fishermen reports and dealer reports, and negative reports. Audits of some form are used by all the respondents and, to the knowledge of the group, all state and federal partners on the Atlantic coast. The use of dealer/fishermen comparison and negative reports

was somewhat inversely correlated where the latter was employed specifically where the timeliness and comprehensiveness of the former was lacking.

3 DATA MANAGER SURVEY

3.1 Background

The ACCSP Data Manager Follow-Up Survey was circulated in September 2020, to 52 data managers including federal partners, state partners, and council and commission staff. See Appendix B for a full list of the survey questions.

3.2 Results

This section summarizes the results of Data Manager Survey by question and discusses suggestions from the AWG to address the issues identified.

3.2.1 Demographics

Thirty-four data managers participated in this survey from 13 different agencies. Of these, two indicated they were not data managers and did not fill in the rest of the survey. The MAFMC representative, three federal respondents, and three state respondents indicated they managed data but did not answer the remaining questions. These nine records were removed from analysis. The final tally of respondents by jurisdiction can be seen in Figure 13.

All managers were asked to identify the sector(s) in which they manage data, commercial, recreational, and/or for-hire. Eleven managers indicated they only manage a single sector with the remaining managing at least two sectors. Those eleven were predominately focused on the commercial sector with one in the for-hire, and three in the recreational. The percent of responses by sector can be seen in Figure 13.

Eighteen state partners responded and of those, five were commercial only, seven for-hire/recreational, and six with some combination of commercial and for-hire/recreational sector management (Table 1). There was one ASMFC respondent for the recreational sector. Six federal partners responded and of those, two were commercial only, one was for-hire only, and three were some combination of commercial and for-hire/recreational sector management.

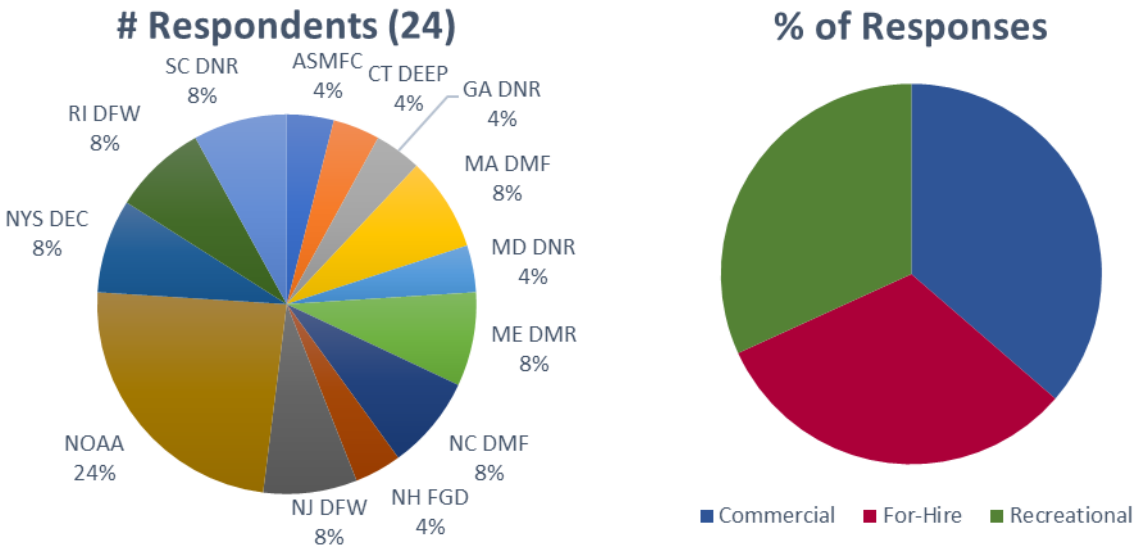

Figure 13. Percent of responses by jurisdiction (left) and by sector (right).

Table 1. Participation by sector and jurisdiction in the Data Managers Follow-up Survey.

Participation by Sector and Jurisdiction				
Jurisdiction	**Sector**			**Total**
	Commercial	**For-Hire**	**Recreational**	
State	11	11	12	18
Federal	5	3	1	6
ASMFC	0	0	1	1
Total	16	14	14	25

3.2.2 Caveats

While participants could select multiple sectors when asked for which they manage data, they could not split their answers between sectors, which led to a sector analysis with some caveats. Those who manage multiple sectors may have responded for one or the other more consistently, or even differently per issue. Moreover, if an issue was primarily intended for a specific sector, the responses were still assigned to all sectors the individual manages. For example, reconciling trip reports and dealer reports, is primarily a commercial issue. If someone managed both commercial and recreational data, their response will show up for both sectors, even though the response is geared towards commercial management.

Additionally, the response options "Never Occurs" and "N/A" were offered as a single response. The few times that this response was selected could mean the individual was uncertain of the process ("N/A") or indicating the issue never happens. Where possible, this was factored into the discussion of each issue.

3.2.3 Overall Trends

In general, all named issues (i.e., 1 through 6, Table 2) appear to impact all jurisdictions at a significant frequency. In all issues except number 7, more than 60% of responses indicated the issue sometimes or frequently occurs, while in half of the issues that percentage reaches over 70% of the responses (Figure 14). This indicates that data managers frequently encounter issues impacting data quality, but may not have the resources, either in time, staff, or technology, to create and maintain extensive accountability practices. The best practices of one jurisdiction may not be feasible in another for a wide variety of reasons resulting in difficulties categorizing and/or broadly defining accountability metrics.

Table 2. Issue codes used for the responses in the Data Managers Survey Follow-up.

Issue Number	Issue Description
1	Lack of metadata and caveats
2	Lack of credibility with particular fields (e.g., gear reported by dealers) or sources (e.g., entities knowingly providing inaccurate information) where the data being collected are not considered particularly reliable. If yes, in the comments please describe any documentation.
3	QA/QC is a manual process with little automation and is time consuming for staff resulting in less timely data
4	Reconciling vessel trip reports with dealer data is difficult and time consuming
5	Confirming corrections with industry members is necessary for trust with industry but can cause delays or data remaining incorrect.
6	Understaffing and/or lack of resources necessary to properly review data in a timely manner leads to delays or data remaining incorrect.
7	Other factors that have not been mentioned above

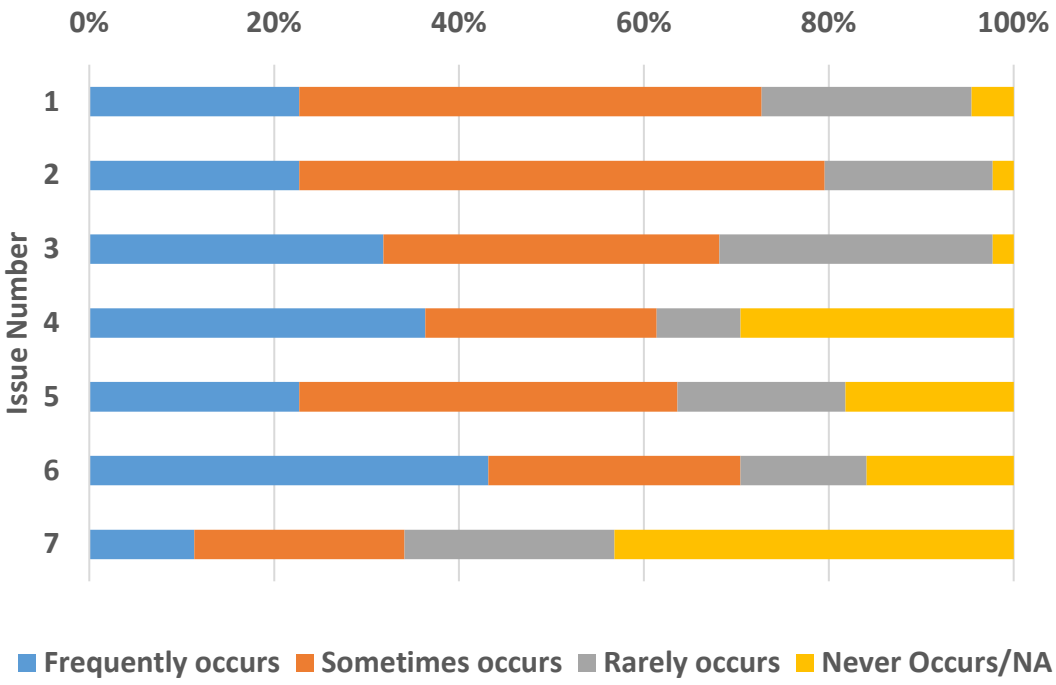

Figure 14. Percent of responses by issue and frequency of occurrence.

3.2.4 Issue 1: Lack of Metadata and Caveats

Documenting metadata and caveats is clearly important to understanding data from a consumer point of view. While managers across jurisdictions agree that this is missing in many cases, there is a disconnect between this acknowledgement and implementation. Additionally, as evidenced by some comments on this issue, managers may be interpreting the question of metadata resources and needs from different perspectives. From the perspective of the consumer, metadata are necessary due to a need for interpretation of data for end products, while from the perspective of those involved in data entry or data quality procedures, they are necessary for understanding how to enter and process data or flag anomalous data. At times, the latter may need more clarity on database specifics than their consumer counterparts.

In all three sectors, this issue of lack of metadata and existing caveats appears to be more prevalent among state partners than federal partners, although the sample size for the federal pool is a third that of the state pool (Figure 15 - Figure 16). The exception to this is the recreational sector under the federal jurisdiction. However, this pool is limited to a single individual who also manages the commercial sector and, in general, their responses tend to skew towards the commercial sector in their comments. However, this question does appear to apply to both sectors and will remain in the analysis. The single response sample size should be noted, however, when interpreting the magnitude of the issue in the recreational sector.

Ultimately, all partners and sectors agree on the importance of metadata and caveats and it is likely a multijurisdictional effort should be undertaken to produce such documents.

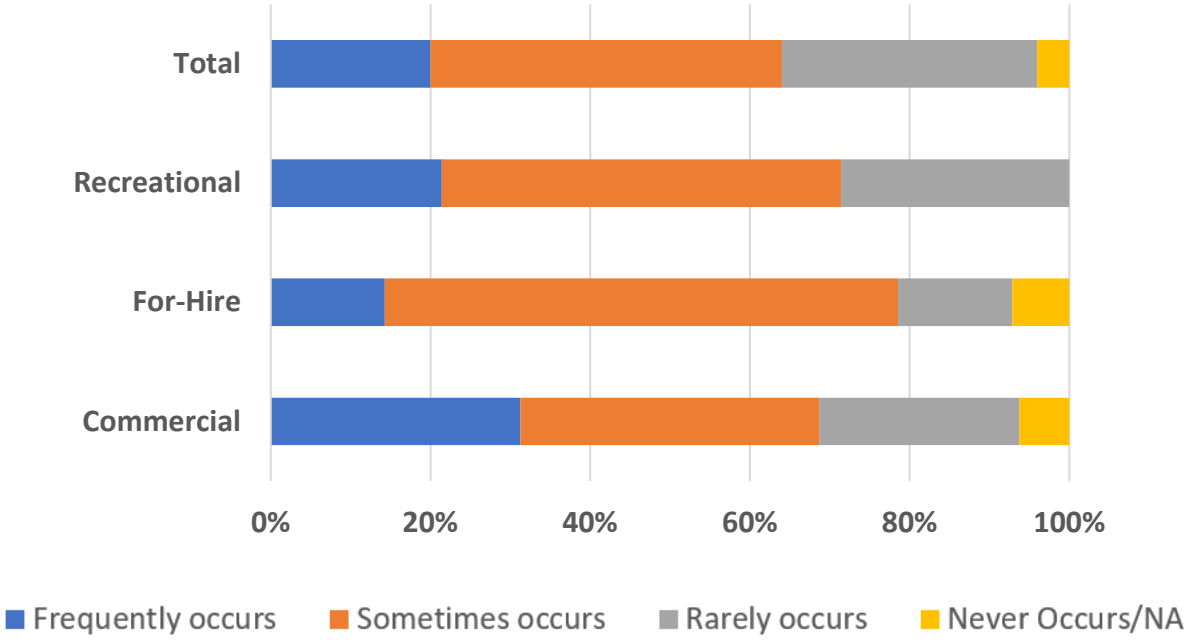

Figure 15. Percent of responses to the "lack of metadata and caveats" problem by sector and frequency of occurrence from all responders.

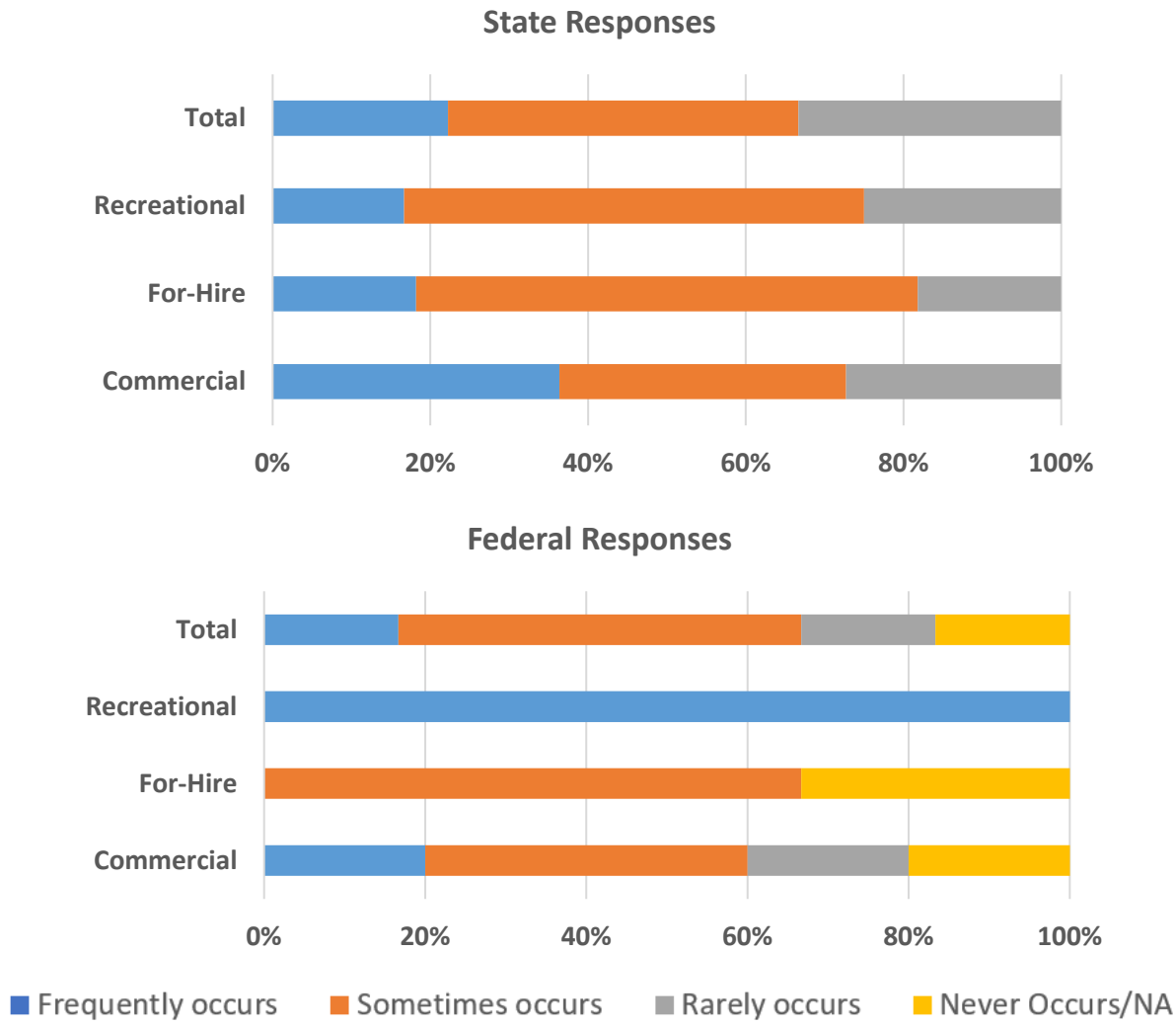

Figure 16. Percent of responses to the "lack of metadata and caveats" problem by sector, jurisdiction, and frequency of occurrence.

3.2.5 Issue 2: Field Credibility

When asked to respond regarding known credibility in certain fields, the issue appeared to be greater for states and in the for-hire sector (Figure 17 - Figure 18). For instance, the "gear code" field is a required field on electronically submitted dealer reports but is widely understood among data managers to be unreliable due to lack of compliance, dealers entering of "unknown" values, and for lack of validation. Gear code is not a required field for some federal and state partners, but it is for others. Data collection applications were originally designed to accommodate the most restrictive partner requirements, and as such, dealers from any jurisdiction are often required to fill out the gear code on their dealer reports, regardless of a regulatory requirement.

In some federal jurisdictions, there are reconciliation processes where federal vessel trip reports are compared to the federal dealer reports, and, in some fisheries, federal dealer

reports have gear information added based on the federal vessel trip reports. Other federal and state partners do not have timely vessel trip report and dealer report reconciliation processes. Due to these differences in how those data are reviewed and updated (i.e., either through reconciling with vessel reports or relying solely on dealer data entry), there are concerns with the accuracy of gears as reported on dealer reports. These concerns are more prominent for state compared to federal counterparts, most likely depending on fishery (Figure 18). That may, in part, be due to some federal data managers having greater confidence in gear codes reconciled from vessel reports rather than gear codes solely reported by dealers. However, data consumers (e.g., stock assessments scientists) still use the dealer reported data as the originally reported data more often persist in the publicly available ACCSP dataset.

Overall, comments indicated a variety of issues by sector. Comments by federal staff generally focused on commercial sector and one comment indicated difficulty in measuring the degree to which such an issue exists. Solutions for credibility issues might be sector or jurisdiction dependent, but perhaps such detail is best served in conjunction with issue 1 (metadata) and should be accommodated as part of "caveats." There was no suggestion by the AWG or by respondents regarding ways to increase reliability of such fields, and in those cases, the only remedy is documentation, or a larger discussion and agreement on how to change remove fields with very low credibility. Generally, if extensive auditing and fishermen and/or dealer contact does not resolve a greater pattern of error, there is little managers can do to remedy such data quality issues other than initiate a broader discussion of altering a field definition or removal of a field altogether.

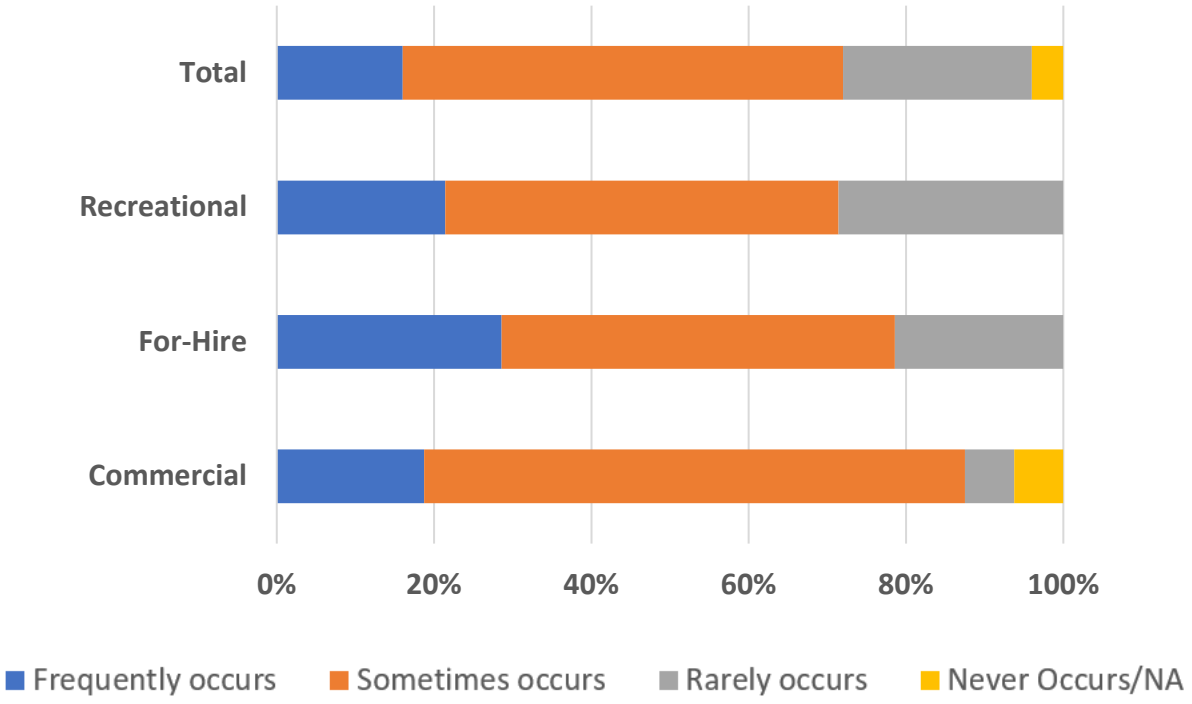

Figure 17. Percent of responses to the "field credibility" problem by sector and frequency of occurrence from all responders.

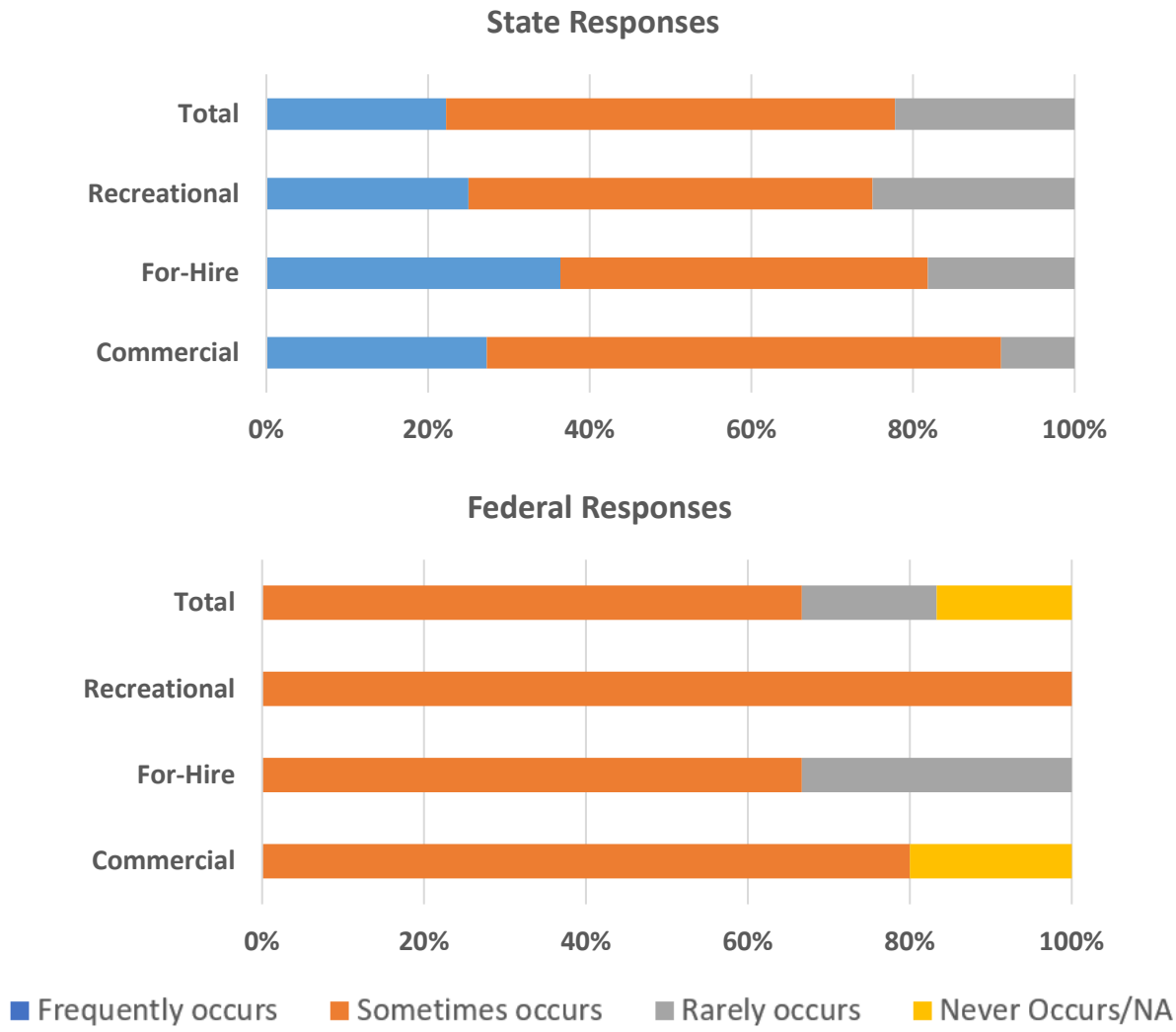

Figure 18. Percent of responses to the "field credibility" problem by sector, jurisdiction, and frequency of occurrence.

3.2.6 Issue 3: QA/QC Automation and Timeliness

Most respondents agreed this is a major time commitment from staff, and many must balance data quality with data entry (Figure 19 - Figure 20). This appears to be a much larger issue overall in the commercial sector, and this could be a function of the number of fields collected. In additions, in the Northeast, a two-ticket system (dealer and vessel reporting) is in place allowing for comparisons among data streams. While all sectors require intensive review due to the inherent error-prone nature of self-reported data, the collection of commercial data is the most detailed, thus requiring more specific intensive review. However, though this review is more intensive, such standardized data have been collected longer than the recreational sector data. Therefore, more time and effort have been spent developing methods for data review resulting in more established protocols available for the commercial sector at this time. Despite

this longer-term effort, automation for many jurisdictions is not available yet, and timeliness of finalizing datasets can still be an issue. Creating new processes takes time and additional effort.

One federal comment in the for-hire sector indicated an automated process that made things easier for QA/QC processes. However, much of the Marine Recreational Information Program (MRIP) and for-hire survey data QA/QC processes are removed from the data managers as they are conducted by ACCSP. While data managers collaborate with their constituents and ACCSP to resolve discrepancies and fix any entry related issues, some of the more pattern-based analyses may not be conducted at the data manager level directly. This may bias such responses for this question in this sector. Such processes and implementation plans could benefit other partners. A multi-jurisdictional group dedicated to sharing uses of available technology could help partners reach milestones and goals otherwise thought to be unattainable.

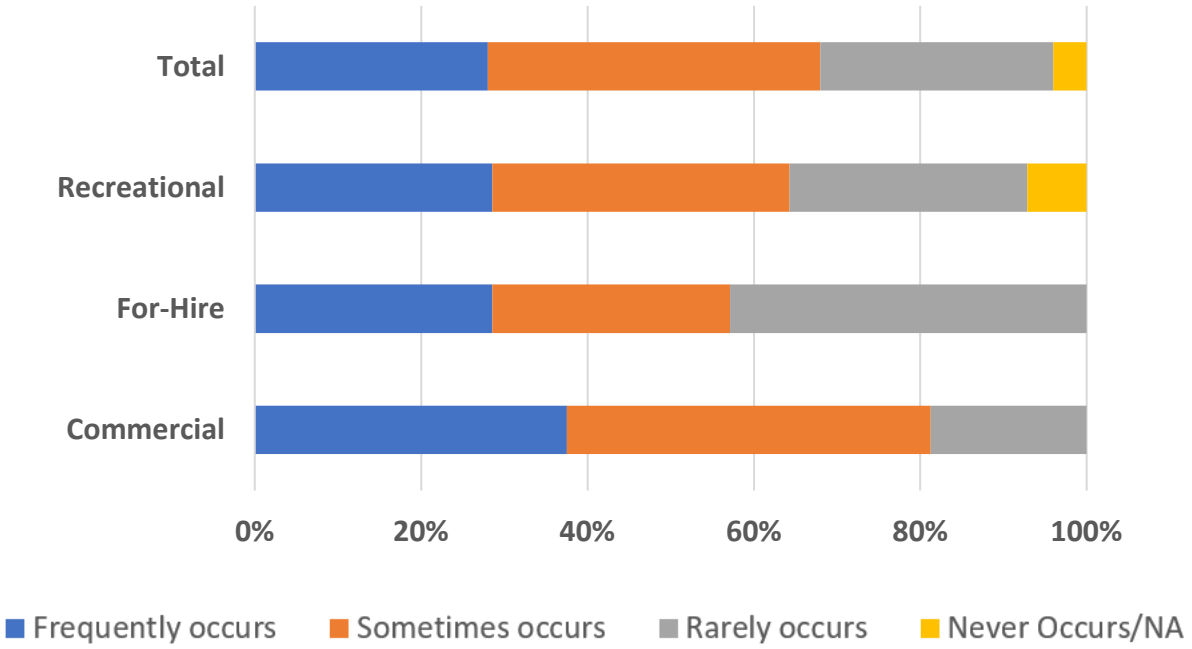

Figure 19. Percent of responses to the "QA/QC" problem by sector and frequency of occurrence from all responders.

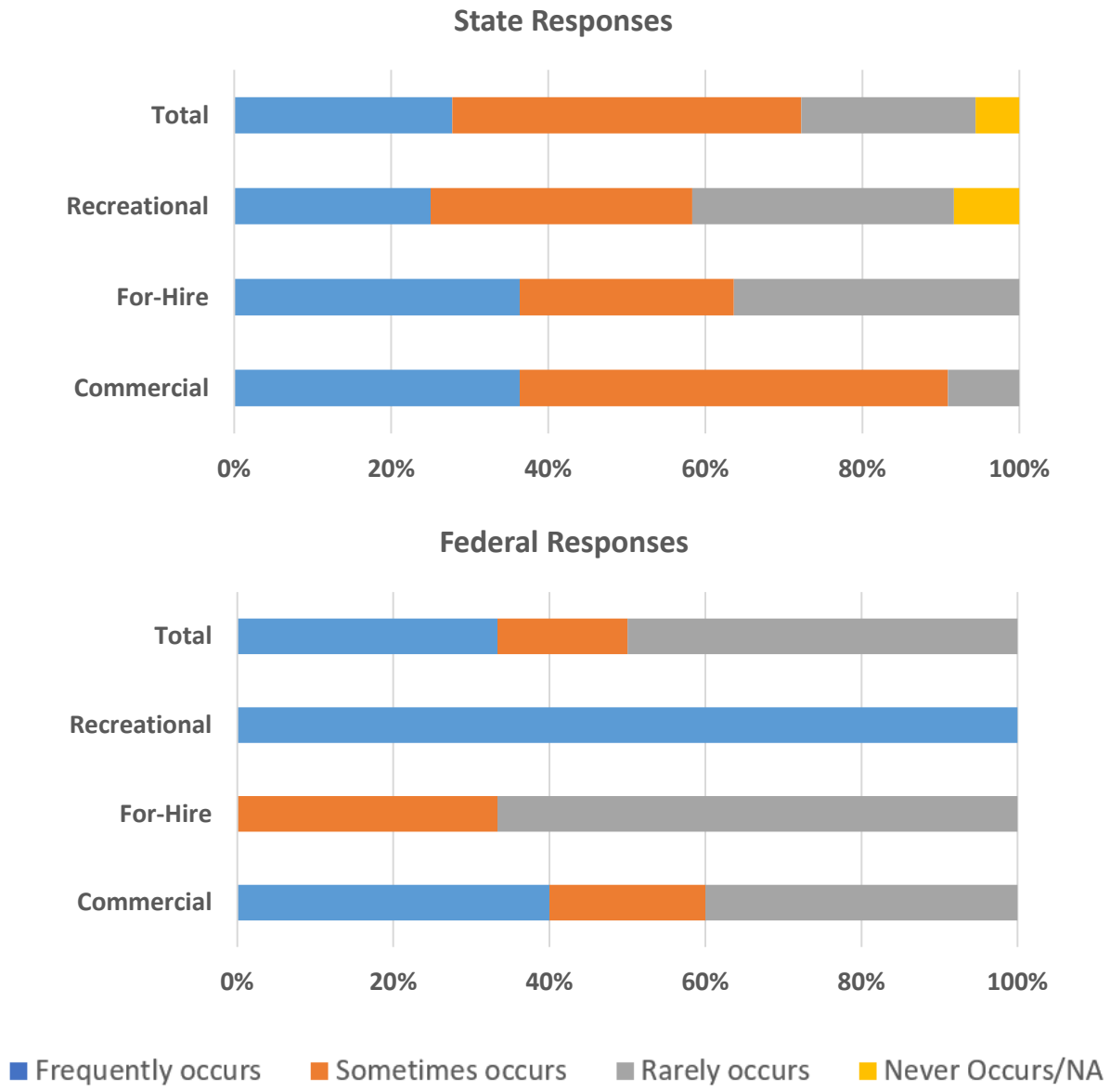

Figure 20. Percent of responses to the "QA/QC" problem by Sector, Jurisdiction, and Frequency of Occurrence

3.2.7 Issue 4: Reconciling Vessel/Harvester Trip Reports with Dealer Reports

By design, this question is geared towards the commercial sector as it is the only one with a dealer report component. Therefore, recreational and most for-hire responses should likely be ignored (Figure 21 - Figure 22). Often matching these two data streams exactly is not possible and inevitably results in a complicated matching process. Comments pertaining to matching issues cite differences between data collection systems, lack of complete/correct data, frequency of submission, and late reports hinder matching processes. Comments pertaining to

reconciliation indicate that sufficient/significant time is needed for following up with identified issues.

This issue is really a specific subset of issue 3 (QA/QC Automation and Timeliness) and part of the QA/QC process for commercial data. Similar to issue 3, sharing best practices/ideas/methods between jurisdictions may benefit all managers moving forward. When feasible, given a jurisdiction's infrastructure and funding, technological advances should be capitalized upon for improving and expanding a jurisdiction's ability to conduct such matching exercises.

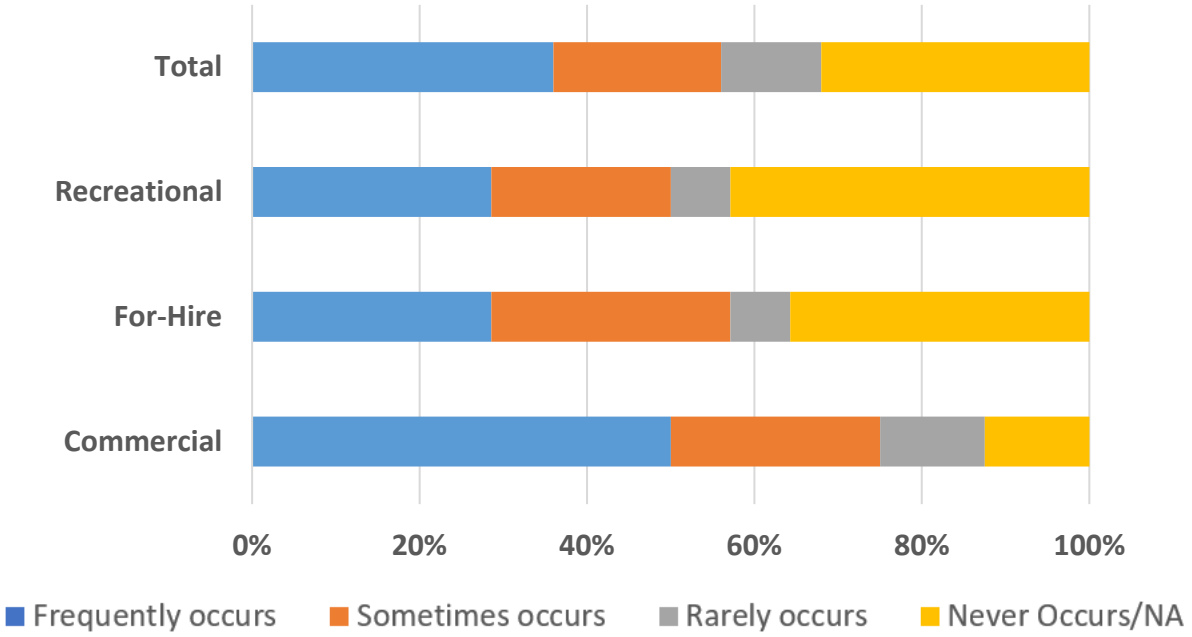

Figure 21. Percent of responses to the "reconciliation of trip and dealer reports" problem by sector and frequency of occurrence from all responders.

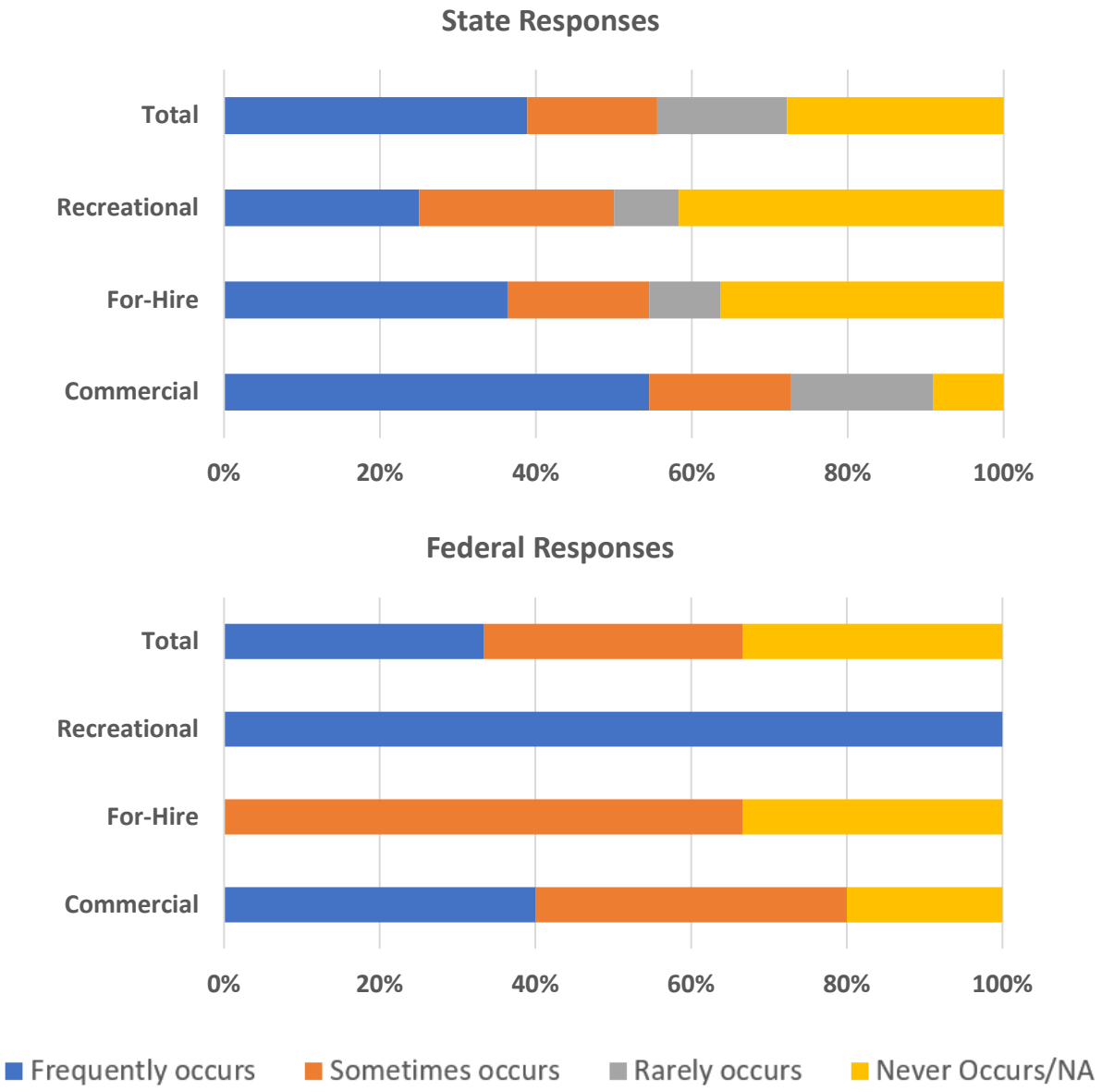

Figure 22. Percent of responses to the "reconciliation of trip and dealer reports" problem by sector, jurisdiction, and frequency of occurrence.

3.2.8 Issue 5: Confirmation of Corrections Impacting Timeliness and Quality

Once again, this issue appears to be a significant commercial issue; however, partners do not appear to agree on the extent of delays or inaccuracies that affect timeliness and quality. For example, when broken by sector and jurisdiction, the federal respondents indicated that this happens frequently with recreational data.(Figure 23 - Figure 24).

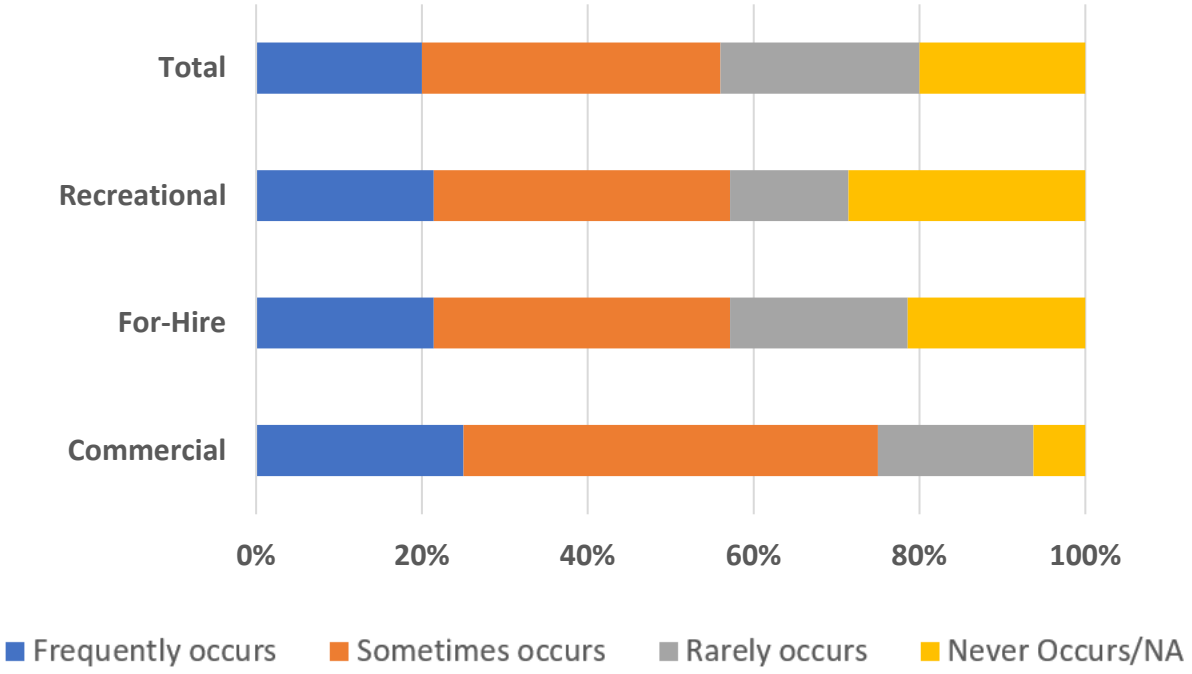

Figure 23. Percent of responses to the "confirming data corrections" in regard to data delays/correctness by sector and frequency of occurrence from all responders.

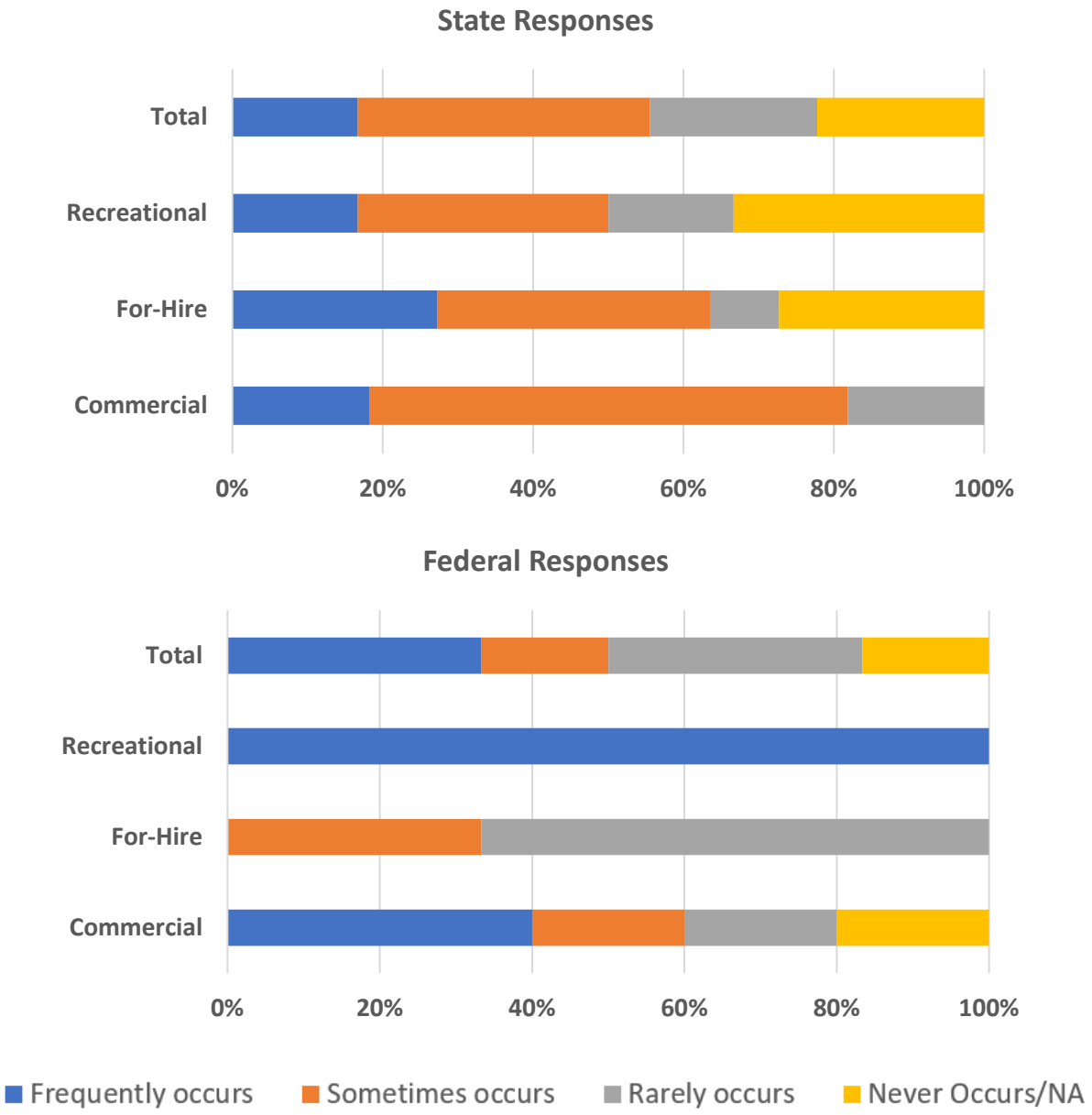

Figure 24. Percent of responses to the "confirming data corrections" in regard to data delays/correctness by sector, jurisdiction, and frequency of occurrence.

3.2.9 Issue 6: Understaffing and Lack of Resources

This issue is seemingly a larger issue among states, but still a large federal issue as well. In states, it is a larger commercial issue; however, among federal responses there is a stronger response from recreational/for-hire managers (Figure 25 - Figure 26).

Sharing practices among jurisdictions may help leverage limited resources too.

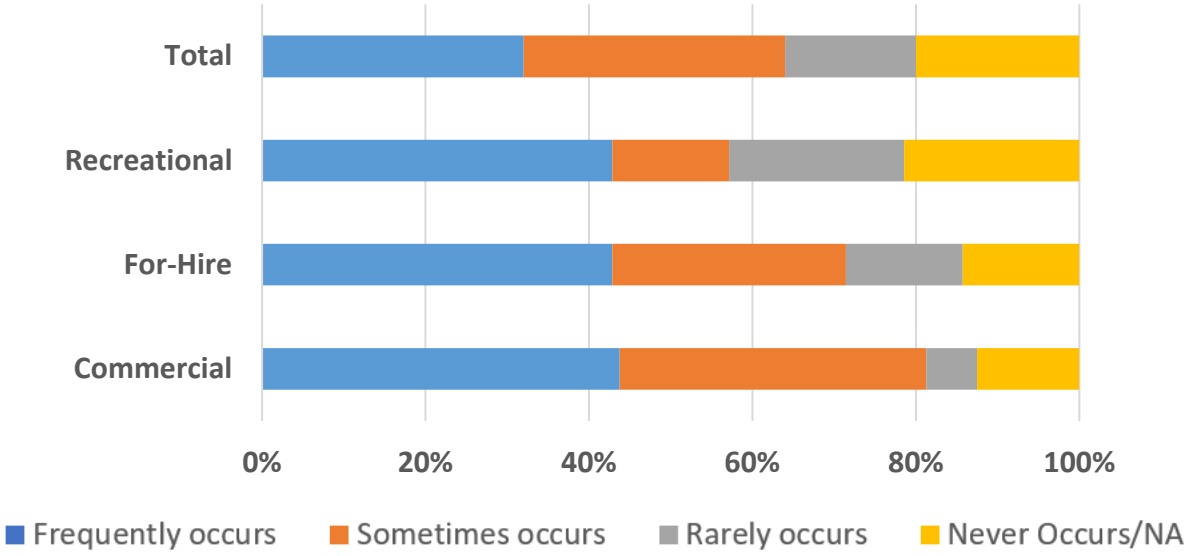

Figure 25. Percent of responses to the "understaffing and lack of resources" problem by sector and frequency of occurrence from all responders.

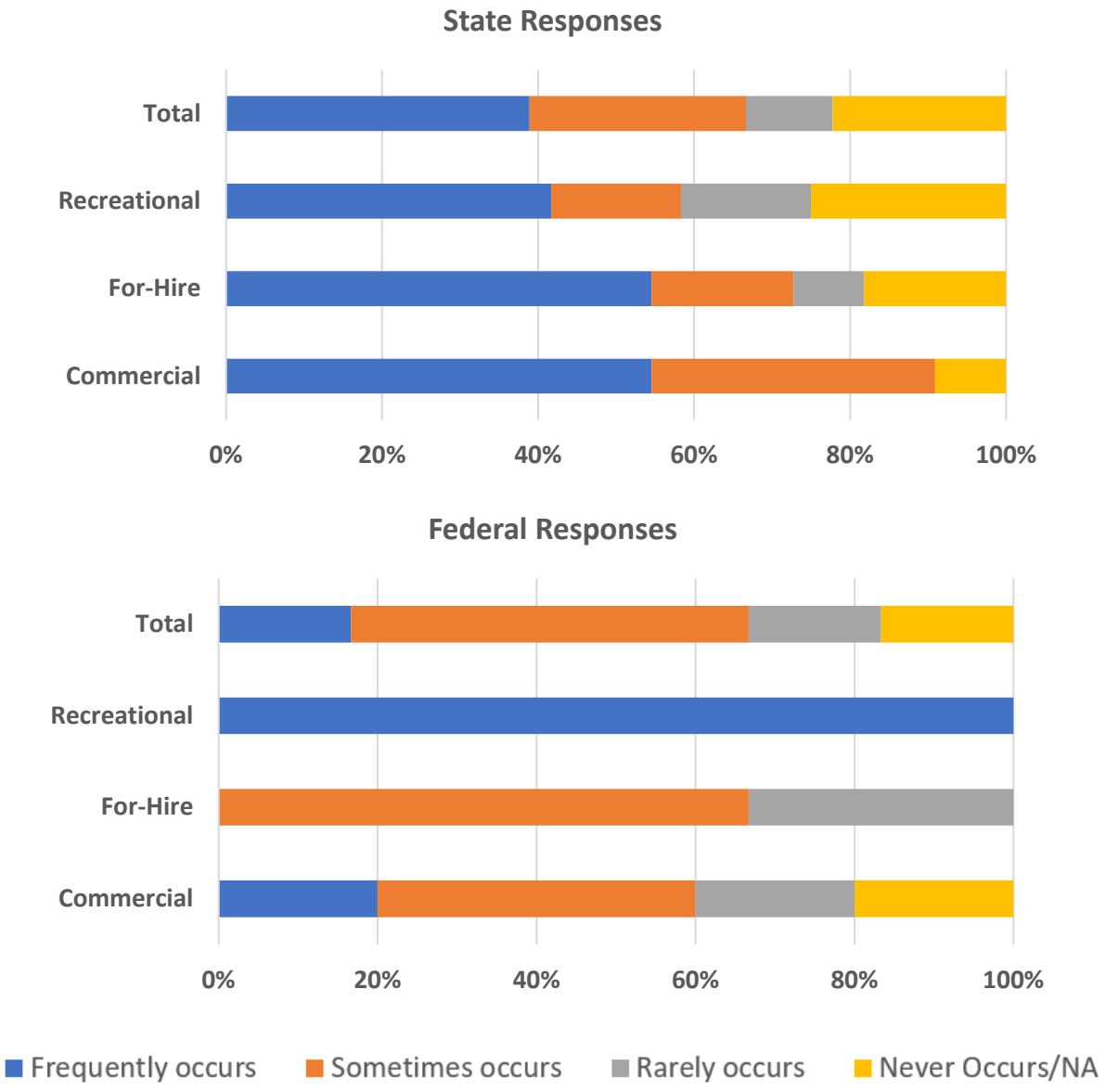

Figure 26. Percent of responses to the "understaffing and lack of resources" problem by sector, jurisdiction, and frequency of occurrence.

3.2.10 Issue 7: Other issues not mentioned above

There were varied answers to this question, and some solutions were suggested. Issues included: the lack of two ticket systems in recreational/for-hire industries that result in unverifiable data and the inability to use commercial QA/QC methods in these sectors; vessel data issues impacting reporting; reporting compliance issues; and individual errors impacting manager's abilities to pull out larger trends.

A suggested solution to some data quality issues was improving front end validations in data entry, which in turn would likely decrease error propagation over time and by users.

3.3 Conclusions and Recommendations

In general, data managers are aware of a variety of issues affecting data quality. This varies by jurisdiction and sector by a fair amount, but regardless of such variability, the impacts to data quality and the inadequate communication of such impacts are substantial. This is particularly true when working with regional or coastal datasets that span multiple jurisdictions.

Based on comments collected from data managers and discussion within the AWG, a number of recommendations are proposed to improve communication of data limitations and provide opportunities for jurisdictions and sectors to expand and streamline processes. Some of these recommendations have already been highlighted above but are summarized here.

- Begin a multijurisdictional effort to document metadata and caveats to be easily interpreted similarly by all data consumers.
- Create a regular and ongoing Best Practices Workshop to discuss and share automation and technical advances that improve data quality.
- Work with ACCSP to develop automated auditing and data validation tools, particularly for their data entry tools, but also for any data validations conducted by partners.
- Identify and share funding resources for development and implementation of technological advances.

4 DATA CONSUMER SURVEY

4.1 Background

The ACCSP Data Consumer Survey was circulated in May, 2021, to over 300 data users including federal partners, technical committee members, state partners, and Council and Commission staff. See Appendix C for a full list of the survey questions.

4.2 Results

This section summarizes the results of Data Consumer Survey by question and discusses suggestions from the AWG to address the issues identified.

4.2.1 Demographics

Forty-seven people responded to the survey from 17 different agencies (Figure 27). The responses were well distributed among agencies although the highest response rates were from Maryland Department of Natural Resources (8 responses or 17%), Georgia Department of Natural Resources (6 responses or 13%), and the Atlantic States Marine Fisheries Commission (ASMFC; 4 responses or 9%). The AWG was satisfied with the distribution of the agencies as representative of data users. Additionally, the majority (66%) of survey responders have been in their current position working with fishery-dependent data for 10 years or more (Figure 28). Most of the participants in the survey indicated that they are using the data for stock assessment or biological analyses (49%; Figure 29) or for management (38%). Only a small

number of responses indicated that the data was being used for socioeconomic analyses (8%) or other purposes (5%).

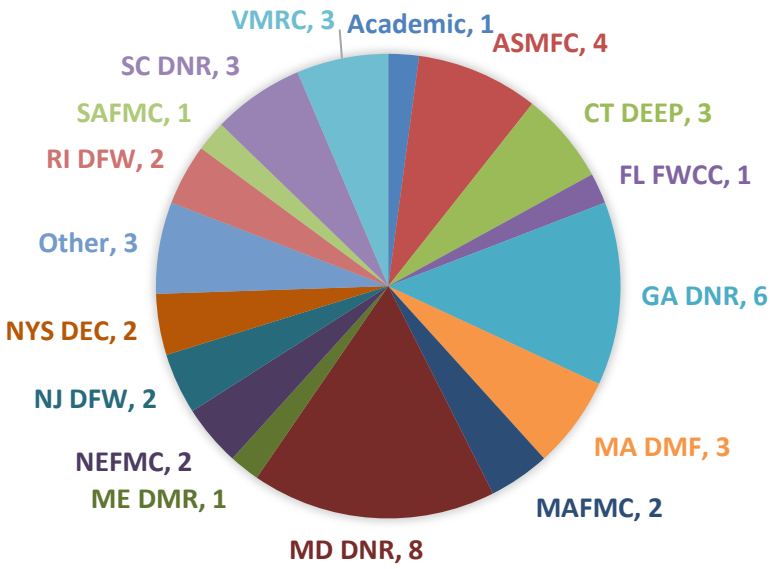

Figure 27. Distribution of 17 agencies represented in the 47 responses.

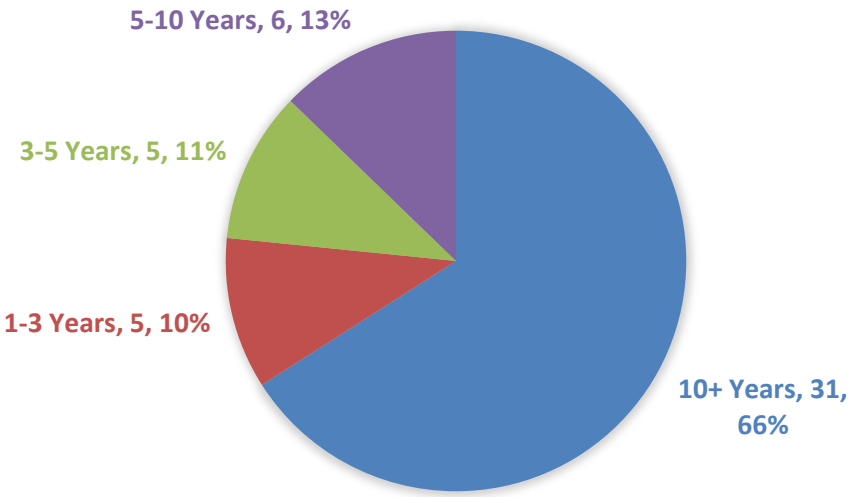

Figure 28. The number of years responders have been in their current position working with fishery-dependent data. The number of responders and percentage indicated in label.

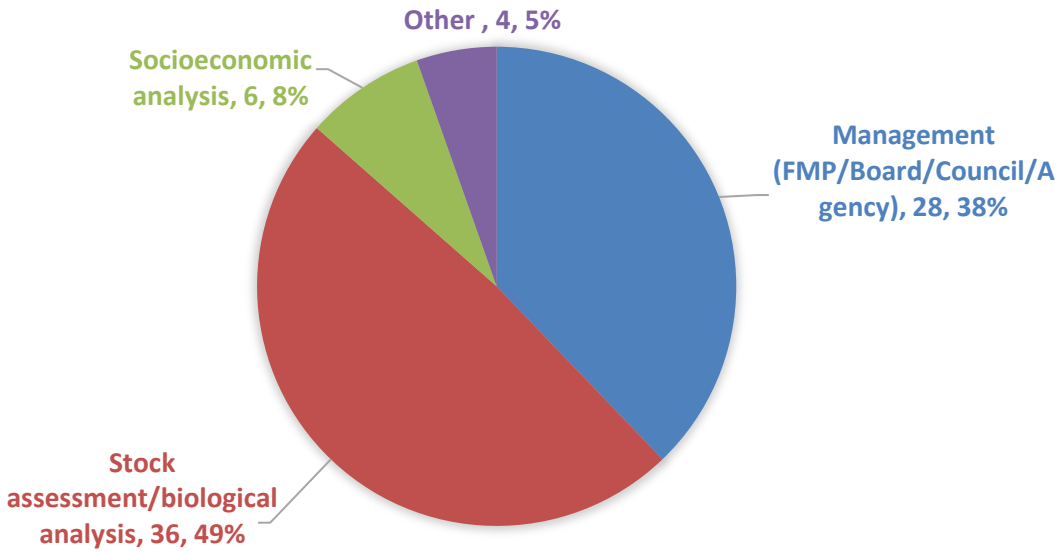

Figure 29. Purpose for using fishery-dependent data as indicated by survey respondents. Multiple options could be checked and sample size and percentage is indicated on the figure.

4.2.2 Is there a lack of metadata? Which of the following situations describes to your experience with metadata and caveats?

A slight majority of respondents indicated that there is a lack of metadata and caveats (Figure 30). When asked about their experience with metadata, most respondents said they were unaware of any available metadata or they did not know where to find it (Figure 31). The AWG members suggest this identifies a communication issue rather than a metadata issue. Metadata is available in the ACCSP warehouse, but the results of the survey clearly show that many users are either unaware of it or do not know where to find it. It was suggested that "Metadata and Caveats" might need its own link on the ACCSP website or a Frequently Asked Questions (FAQ) document could be developed that would address where to find metadata and caveats.

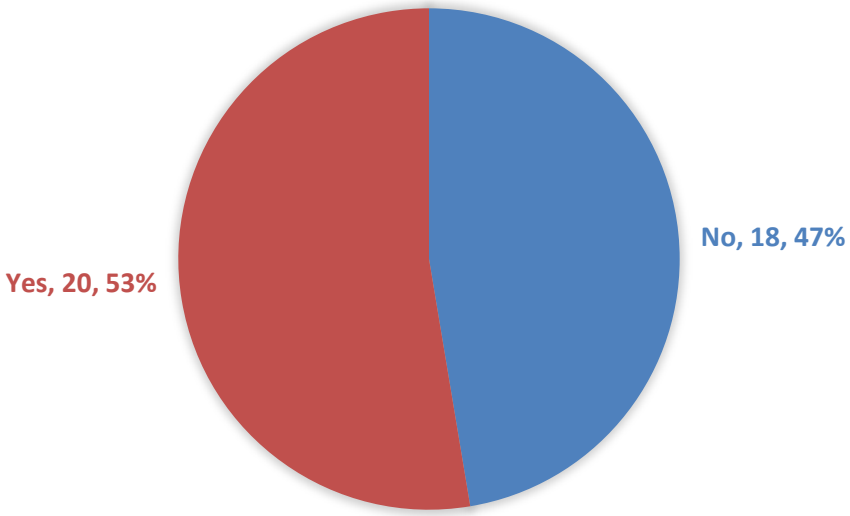

Figure 30. Responses to the survey question, "Is there a lack of metadata and caveats?" with number of respondents and percentages.

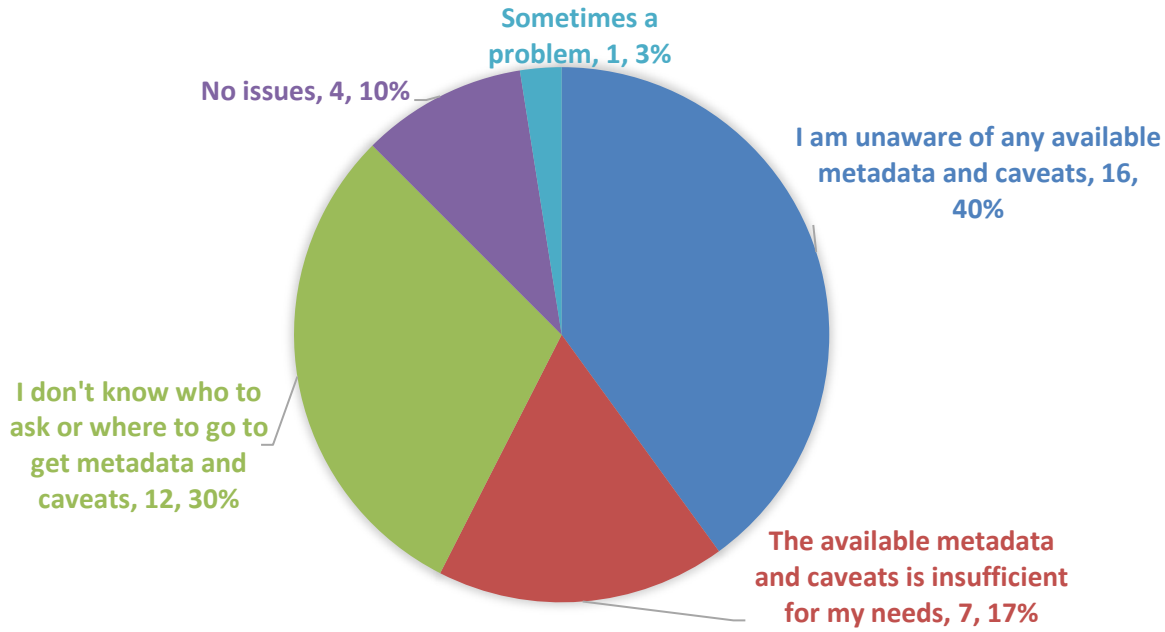

Figure 31. Responses to the survey question, "What describes your experience with metadata and caveats?" with number of responses and percentage.

4.2.3 Is there a lack of clearly defined data elements/fields?

Most participants in the survey (63%) indicated that a lack of clearly defined data fields is sometimes an issue (Figure 32). There was also some support (19%) for this occurring but not being an issue. There were no responses indicating that a lack of defined data fields is frequently an issue, which was encouraging to the AWG. Regardless, the survey identified that there is a need for more clearly defined data fields and the AWG recommends that ACCSP and data providers should review data element/field definitions to make sure they are as comprehensive as possible. Additionally, identifying the location of a data dictionary could be added to a FAQ page. The AWG also discussed that a data definition could be incorporated into the data download as a tab or a row.

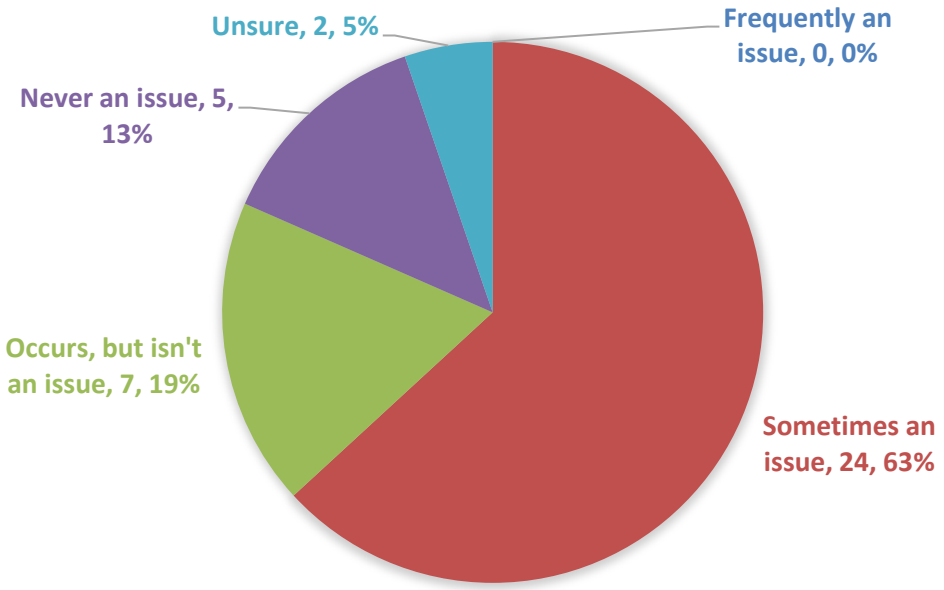

Figure 32. Responses to the survey question, "Is there a lack of clearly defined data elements/fields?" with number of responses and percentage.

4.2.4 Is there a lack of credibility with particular fields or data sources?

The majority of responders indicated that a lack of credibility with data fields is sometimes an issue (32%; Figure 33) or that they are unsure if this is an issue (26%). The AWG discussed that when ACCSP reviews data element/field definitions (a recommendation from Section 4.2.3), it could be an opportunity to clearly identify which fields have more credibility and address the issue identified by this question. The revised definitions or data dictionary could also note the lack of reliability for some fields or note when there is a better source in the warehouse. For example, the gear data field on a dealer report may be a less reliable field and the data field definition could explain why it may be better to find this information on fisherman trips.

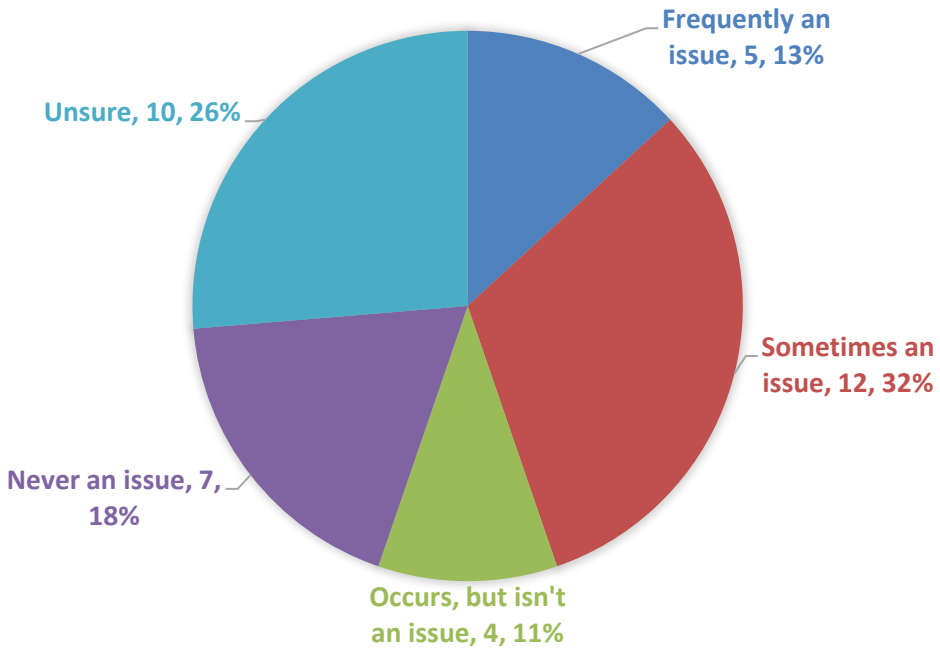

Figure 33. Reponses to the survey question, "Is there a lack of credibility with particular fields or data sources?" with number of responses and percentage.

4.2.5 Is the timing of data availability an issue?

The AWG anticipated that the timing of data availability could be an issue for data users when doing a stock assessment, compliance report, or management document. The responses in the survey supported the hypothesis that this is sometimes (39%; Figure 34) or frequently (18%) an issue. There were some (32%) that indicated that the timing of data availability is never an issue. For the last few years, ACCSP and ASFMC staff have worked together to line up the timing of stock assessments or management documents with data availability which may have contributed to resolving some timing issues. ASMFC should continue to include an ACCSP representative in the early planning stages of a stock assessment or management document to ensure data will be ready when needed and formalize this process with staff. Additionally, a workshop could be organized between ACCSP and ISFMP staff to ensure that species' compliance report deadlines match up with data availability. It was also noted by the AWG that the caveats and timing of the spring and fall data loads for commercial data as well as the timing of recreational, biological, and socioeconomic data could be better communicated and possibly included in a FAQ. Additional outreach to the Councils, Regional Offices, Science Centers, and NOAA Highly Migratory Species group could also improve the communication of data timing.

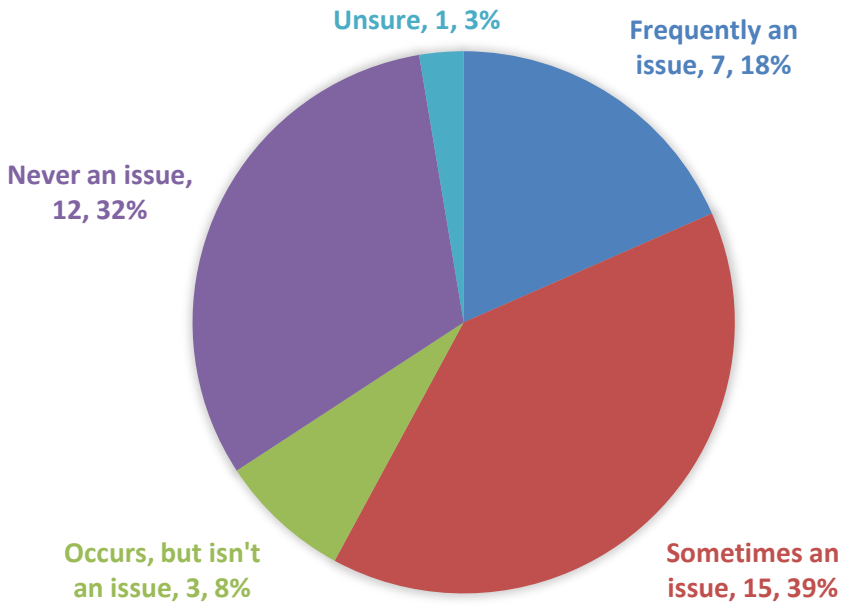

Figure 34. Responses to the survey question, "Is the timing of data availability an issue?" with number of responses and percentage.

4.2.6 Is inconsistency between data sources an issue?

Most respondents indicated that inconsistency between data sources is sometimes an issue (58%; Figure 35) or frequently an issue (21%), making this one of the bigger problems identified by the survey. The AWG discussed how data users have expressed frustration about queries resulting in different answers between a user's warehouse query and data provided by ACCSP staff. Additionally, this can be compounded by different data across sources, for example, a data pull from Northeast Fisheries Science Center (NEFSC) Area Allocation (AA) tables or data pulled from the ACCSP warehouse. Again, the AWG identified this as a potential communication issue. A communications document, whether a FAQ, webpage, or expanded metadata document, could include information about why different data sources have different data and why different queries may result in different data. Additionally, all data repositories should indicate the source of the data so that time and effort are not wasted in identifying differences that would be readily explained by knowing the source of the data.

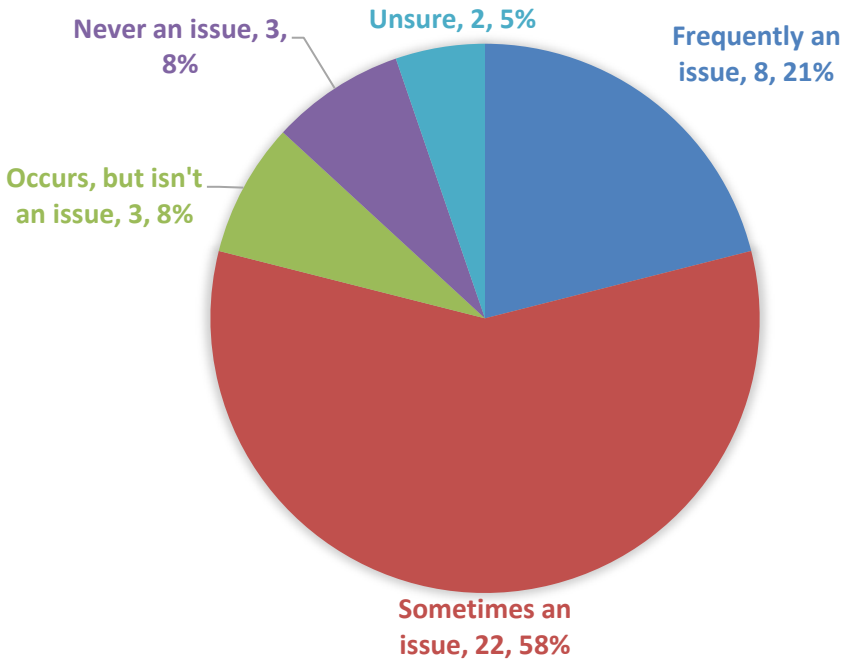

Figure 35. Responses to the survey question, "Is inconsistency between data sources an issue?" with number of responses and percentage.

4.2.7 Are differences in data collection approaches between agencies an issue?

Respondents to the survey indicated that differences in data collection approaches is sometimes an issue (55%; Figure 36) although the remaining responses were mixed between frequently an issue (11%), never an issue (13%), occurs but isn't an issue (8%), and unsure (13%). Much like the previous question, the AWG believes that communicating differences in data collection programs between partners and agencies to data users should be a priority. The AWG discussed outreach materials to explain each data collection approach with links provided to other pages and data contacts. An additional approach that the AWG discussed was organizing a Best Practices Workshop for data providers to compare data collection programs, audits, and trips/dealer reports. This was identified as a potential Fisheries Information System (FIS) project for FY2023.

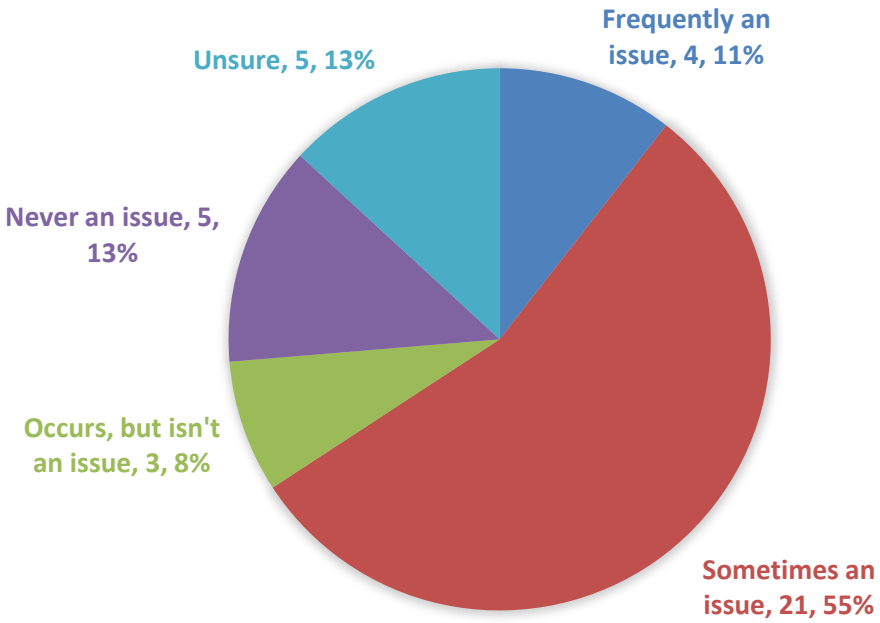

Figure 36. Responses to the survey question, "Are differences in data collection approaches between agencies an issue?" with number of responses and percentage.

4.2.8 Is accessibility to data an issue?

Accessibility to data is sometimes an issue (45%; Figure 37) for many data users or never an issue for data users (42%). The AWG attributed these responses to data confidentiality issues and the varying level of access and understanding that data users have regarding confidential data. Most data users are likely familiar with data confidentiality laws and understand how this might affect data warehouse queries depending on their access. However, some data users might not, and the AWG discussed possible solutions to this problem including publishing non-confidential summary data and providing more explicit explanations about federal laws regarding confidentiality on the ACCSP website.

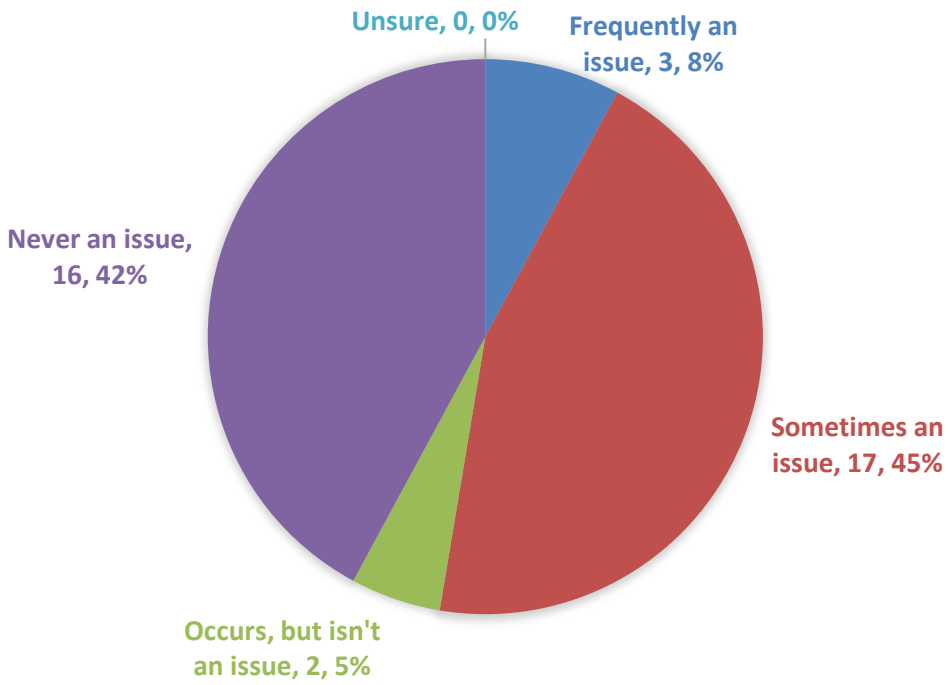

Figure 37. Responses to the survey question, "is accessibility to data an issue?" with number of responses and percentage.

4.2.9 Do you have a hard time finding answers to questions about data?

Most data users indicated that finding answers to data questions is sometimes an issue (46%; Figure 38) or never an issue (33%). Again, this appears to be a communication issue and many of the solutions already discussed are relevant including instructions on finding answers on an FAQ page, making the list of data contacts more readily available, or increasing awareness of the data warehouse and data fields for data users.

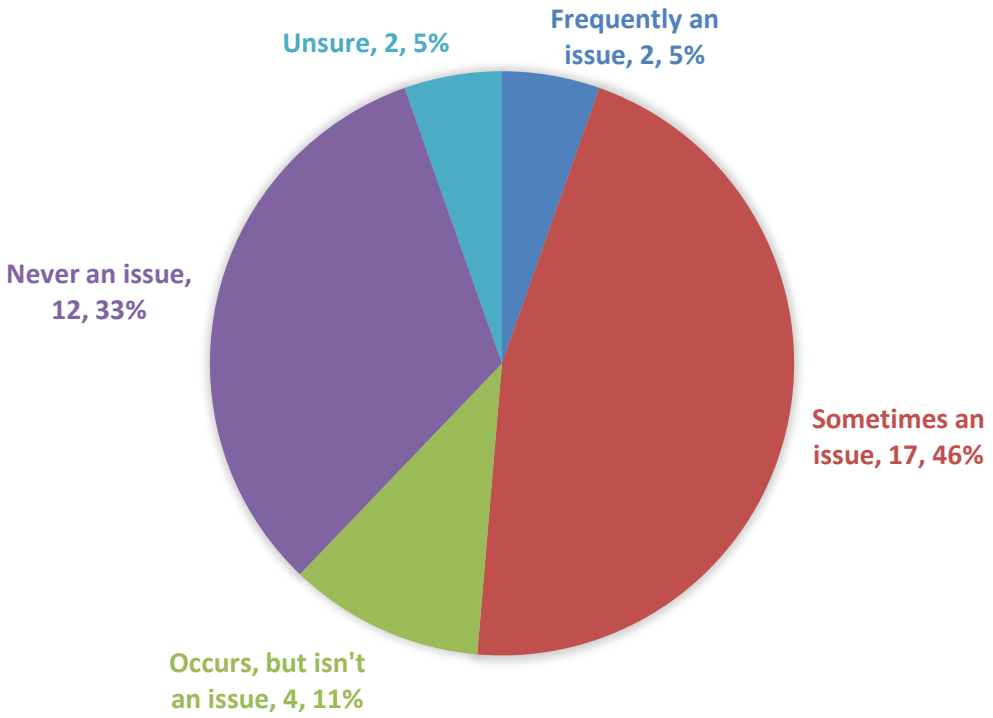

Figure 38. Responses to the survey question, "Do you have a hard time finding answers to questions about data?" with number of responses and percentage.

4.3 Conclusions and Recommendations

Overall, the AWG found that the responses to the data user survey helped identify several issues, most of which were likely communication and not data issues. These generated productive discussions about possible resolutions. The following recommendations were made from the AWG based on the survey's responses.

- Develop a FAQ document to increase communication and outreach to data users
- ACCSP and data providers should review data element/field definitions to make sure they are as comprehensive as possible, including indicating the reliability of each field, and consider including data definitions as part of the data download as a tab or a row
- Consider a Best Practices Workshop as part of FIS projects for FY2023 for data providers to compare data collection programs, audits, and trips/dealer reports
- Expand and simplify the language on the website to better describe the federal laws regarding data confidentiality and data sources and possible affects that may have on a data query
- Continue the communication between ACCSP and ASMFC staff about data timing for stock assessments, management documents, and compliance reports

5 CONCLUSIONS

Overall, the AWG found that the responses to the surveys provided a comprehensive enough inventory of the primary methods of accountability to identify issues and potential gaps. From the initial survey, the group was able to identify differing patterns of use of accountability methods in state and federal partners, and even within federal partners. Based on the comments of the initial survey, responses to the follow-up surveys, and the experience of the AWG group, it is believed that this is due to differences in resources among jurisdictions and/or specific constraints of the data collected by different partners/jurisdiction. This was evident in the inversely correlated use of dealer/fishermen report comparisons and negative reporting.

Data managers are aware of an assortment of issues affecting data quality that vary by jurisdiction. There are substantial impacts to data quality which are not adequately communicated, particularly with respect to multi-jurisdictional datasets. The AWG developed recommendations geared toward improving communication of data limitations and providing opportunities to expand and streamline processes.

The responses from the data user survey helped the AWG to identify several issues. Examination of these issues led to the belief that the core of the issue was not the data, but rather communication between the data providers and users. Recommendations were developed by the group aimed at improving communication between these two groups.

6 RECOMMENDATIONS

The following is a summary list of the recommendations developed by the AWG.

- Begin a multijurisdictional effort to document metadata and caveats to be easily interpreted similarly by all data consumers.
- Create a regular and ongoing Best Practices Workshop to discuss and share automation and technical advances that improve data quality.
- Consider a Best Practices Workshop as part of Fisheries Information System (FIS) projects for fiscal year 2023 for data providers to compare data collection programs, audits, and trips/dealer reports.
- Work with ACCSP to develop automated auditing and data validation tools, particularly for their data entry tools, but also for any data validations conducted by partners.
- Identify and share funding resources for development and implementation of technological advances.
- Develop a FAQ document to increase communication and outreach to data users.
- Review of data element/field definitions to make sure they are as comprehensive as possible, including indicating the reliability of each field, and consider including data definitions as part of the data download as a tab or a row.

- Expand and simplify the language on the ACCSP website to better describe the state and federal laws regarding data confidentiality and data sources and possible affects that may have on a data query.
- Continue the communication between ACCSP and ASMFC staff about data timing for stock assessments, management documents, and compliance reports.

7 APPENDICES

7.1 Appendix A: Data Accountability Survey

The purpose of this survey is to document how ACCSP Program Partners currently validate their commercial landings data. Please indicate whether your agency currently employs each of the validation methods listed.

For each validation method used, please explain: your process, the percentage of landings data covered by this method, and how you resolve any data discrepancies which may be identified. If you have existing documentation you would like to submit, please email it to support@accsp.org.

1. What agency do you represent? (Open-ended)
2. Does your agency use onboard observers to validate trip data? (Yes/No)

If yes, please briefly explain your process, the percentage of landings data covered by this method, and how you resolve any data discrepancies. (Open-ended)

3. Does your agency use dockside monitoring/sampling to validate landings data? (Yes/No)

If yes, please briefly explain your process, the percentage of landings data covered by this method, and how you resolve any data discrepancies. (Open-ended)

4. Does your agency compare fishermen trips to dealer reports to validate landings data? (Yes/No)

If yes, please briefly explain your process, the percentage of landings data covered by this method, and how you resolve any data discrepancies. (Open-ended)

5. Does your agency conduct interagency comparisons to validate landings data (i.e., comparing a state report to a federal VTR)? (Yes/No)

If yes, please briefly explain your process, the percentage of landings data covered by this method, and how you resolve any data discrepancies. (Open-ended)

6. Does your agency use VMS to validate reported 6 trip data? (Yes/No)

If yes, please briefly explain your process, the percentage of landings data covered by this method, and how you resolve any data discrepancies. (Open-ended)

7. Does your agency require pre-trip notifications or hail outs to validate 7 landings data? (Yes/No)

If yes, please briefly explain your process, the percentage of landings data covered by this method, and how you resolve any data discrepancies. (Open-ended)

8. Does your agency require negative trip reports? (Yes/No)

If yes, please briefly explain your process, the percentage of landings data covered by this method, and how you resolve any data discrepancies. (Open-ended)

9. Does your agency conduct data audits? (Yes/No)

If yes, please briefly explain your process, the percentage of landings data covered by this method, and how you resolve any data discrepancies. (Open-ended)

10. Does your agency use law enforcement to validate landings data (i.e., boardings/inspections by Natural Resources Police)? (Yes/No)
11. Please briefly describe any validation methods used by your agency that were not previously included. Briefly explain your process, the percentage of landings data covered by this method, and how you resolve any data discrepancies. (Open-ended)

7.2 Appendix B: Data Accountability Survey Follow-up

The ACCSP Coordinating Council recognized the issue that data validation and accountability issues can compromise data quality and reduce their utility for stock assessments, compliance reports, and other management activities. A small group from the Commercial Technical Committee has been tasked with inventorying and identifying the gaps in the current practices and procedures for data validation. This short survey is a follow-up to the January, 2019 Partner Data Accountability Survey completed by the Commercial Technical Committee that collected current partner data validation practices and procedures. It is an integral part of the process for the small group and your time and considered responses are greatly appreciated. The survey should take approximately 5 minutes to complete.

1. Please indicate the sector for which you manage data. (Please check all that apply.)

☐ Commercial

☐ For-Hire

☐ Recreational

☐ Other (please specify)

2. Please choose your agency. (Drop down list of state and federal agencies)
3. For each of the potential issues related to accountability, please rate what you see when reconciling data provided by entities in your jurisdiction.

    a. Lack of metadata and caveats

    ☐ Frequently occurs

    ☐ Sometimes occurs

    ☐ Rarely occurs

    ☐ Never Occurs/NA

    ☐ Occurs, but isn't an issue

    Comments (open-ended)

    b. Lack of credibility with particular fields (gear reported by dealers) or sources (entities knowingly providing inaccurate information) where the data being collected are not considered particularly reliable. If yes, in the comments please describe any documentation.

    ☐ Frequently occurs

    ☐ Sometimes occurs

    ☐ Rarely occurs

    ☐ Never Occurs/NA

    ☐ Occurs, but isn't an issue

    Comments (open-ended)

c. QA/QC is a manual process with little automation and is time consuming for staff resulting in less timely data

☐ Frequently occurs

☐ Sometimes occurs

☐ Rarely occurs

☐ Never Occurs/NA

☐ Occurs, but isn't an issue

Comments (open-ended)

d. Reconciling vessel trip reports with dealer data is difficult and time consuming

☐ Frequently occurs

☐ Sometimes occurs

☐ Rarely occurs

☐ Never Occurs/NA

☐ Occurs, but isn't an issue

Comments (open-ended)

e. Confirming corrections with industry members is necessary for trust with industry but can cause delays or data remaining incorrect.

☐ Frequently occurs

☐ Sometimes occurs

☐ Rarely occurs

☐ Never Occurs/NA

☐ Occurs, but isn't an issue

Comments (open-ended)

f. Understaffing and/or lack of resources necessary to properly review data in a timely manner leads to delays or data remaining incorrect.

☐ Frequently occurs

☐ Sometimes occurs

☐ Rarely occurs

☐ Never Occurs/NA

☐ Occurs, but isn't an issue

Comments (open-ended)

g. Other factors that have not been mentioned above

☐ Frequently occurs

☐ Sometimes occurs

☐ Rarely occurs

☐ Never Occurs/NA

☐ Occurs, but isn't an issue

Comments (open-ended)

7.3 Appendix C: Consumer Data Accountability Survey

The ACCSP Coordinating Council recognized the issue that data validation and accountability issues can compromise data quality and reduce their utility for stock assessments, compliance reports, and other management activities. A small group from the Commercial Technical Committee has been tasked with inventorying and identifying the gaps in the current practices and procedures for data validation. This short survey is a follow-up to the January, 2019, Partner Data Accountability Survey completed by the Commercial Technical Committee that collected current partner data validation practices and procedures. It is an integral part of the process for the small group and your time and considered responses are greatly appreciated. The survey should take approximately 5 minutes to complete.

1. Please choose your agency. (Drop down list of state and federal agencies)
2. About how long have you been in a position that works with fisheries dependent data?

☐ < 1 Year

☐ 1-3 Years

☐ 3-5 Years

☐ 5-10 Years

☐ 10+ Years

3. Please indicate the sector for which you now and/or previously worked with data. (Please check all that apply.)

☐ Commercial

☐ For-Hire

☐ Recreational

☐ Other (please specify)

4. Please indicate the option(s) that describes your role in when using data. (Please check all that apply.)

☐ Management (FMP/Board/Council/Agency)

☐ Stock assessment/biological analysis

☐ Socioeconomic analysis

☐ Other (please specify)

5. Please indicate what you experience when working with data provided by entities on the Atlantic Coast.

    a. Lack of clearly defined data elements/fields

    ☐ Frequently an issue

    ☐ Sometimes an issue

    ☐ Never an issue

☐ Occurs, but isn't an issue

☐ Unsure

b. Lack of credibility with particular fields or data sources

☐ Frequently an issue

☐ Sometimes an issue

☐ Never an issue

☐ Occurs, but isn't an issue

☐ Unsure

c. Timing of data availability

☐ Frequently an issue

☐ Sometimes an issue

☐ Never an issue

☐ Occurs, but isn't an issue

☐ Unsure

d. Inconsistency between data sources

☐ Frequently an issue

☐ Sometimes an issue

☐ Never an issue

☐ Occurs, but isn't an issue

☐ Unsure

e. Differences in data collection approaches between agencies

☐ Frequently an issue

☐ Sometimes an issue

☐ Never an issue

☐ Occurs, but isn't an issue

☐ Unsure

f. Accessibility to data

☐ Frequently an issue

☐ Sometimes an issue

☐ Never an issue

☐ Occurs, but isn't an issue

☐ Unsure

g. Hard time finding answers to questions about data

☐ Frequently an issue

☐ Sometimes an issue

☐ Never an issue

☐ Occurs, but isn’t an issue

☐ Unsure

h. Other factors that have not been mentioned above

☐ Frequently an issue

☐ Sometimes an issue

☐ Never an issue

☐ Occurs, but isn’t an issue

☐ Unsure

6. If you answered "Frequently an issue" or "Sometimes an issue to "Lack of credibility with particular fields or data sources" in Question 5, please expand. Enter NA if not applicable. (Open-ended)
7. Do you feel there is a lack of metadata and caveats available? (Yes/No)
8. Which of the following situations describes to your experience with metadata and caveats? (Please check all that apply)

☐ I am unaware of any available metadata and caveats

☐ The available metadata and caveats is insufficient for my needs

☐ I don't know who to ask or where to go to get metadata and caveats

☐ Other (please specify)

9. Please describe anything that you feel is relevant and has not yet been covered by this questionnaire. (Open-ended)

Atlantic Coastal Cooperative Statistics Program

Coordinating Council

May 2, 2022

ACCSP Atlantic Recreational Implementation Plan – 2023-2027

Summary: This DRAFT document is provided to the Coordinating Council for awareness of progress, opportunity to discuss or direct development, and plan to bring a final document to the Council for approval in October, 2022. Staff requests a review of the major priorities (page 8) which have been updated based on Coordinating Council comments and re-ranked by the Recreational Technical Committee.

Background: Regional Recreational Implementation plans are developed for MRIP with ACCSP functioning as the Atlantic Coast Regional partner, and MRIP uses the 5-6 regional plans to set national priorities. These plans should be updated when a major change in regional priorities occurs, or every five years. As part of the MRIP Regional Implementation Council, ACCSP gathers input from our Partners (Commission, Councils, and states) on priority areas to direct resources. MRIP and ACCSP request that Partner priorities for recreational data collection are properly reflected in the Atlantic Regional Implementation Plan.

An example of how the current 2017-2022 Implementation plan was used is the work by MRIP to address Atlantic Priority 1 – Reduce PSE. Over the last 5 years, MRIP has developed data and survey standards for public presentation of MRIP data where cumulative estimates are intended to increase sample size and reduce the confidence intervals around point estimates. MRIP also secured additional funding via the Modern Fish Act resulting in $900,000 per year to increase dockside sampling assignments for Maine to Georgia. Those sampling efforts became fully active in 2021. The overall sampling assignment increase was ~30%, with variability along the coast. MRIP, ACCSP, and the states worked together to allocate funds and assignments by APAIS sampling season length, species diversity, and fishing mode (Charter, Private-Rental, Shore).

ACCSP Atlantic Recreational Implementation Plan – 2023-2027

The Atlantic Coastal Cooperative Statistics Program (ACCSP) is a state-federal cooperative program to collect, manage, and disseminate statistical data and information on the marine and estuarine commercial and recreational fisheries of the Atlantic Coast. The ACCSP has provided coordination and data collection standards for recreational data collection efforts from Maine to Florida since 2004 and has been identified as an appropriate group to develop a regional implementation plan for the Marine Recreational Information Program (MRIP) of NOAA Fisheries. The MRIP was developed in 2008 out of the need to modify survey methods for collecting saltwater recreational fishery data for estimating fishery catch and effort for use by stock assessment scientists and marine fishery managers. Improvements to the quality and coverage of recreational data collections were initiated following a critical review of then-current survey methods by the National Resource Council (NRC) in 2006. As the MRIP evolved, ACCSP members have played a more active role in assisting with these improvements, including active roles in MRIP pilot research projects to test new data collection techniques. The MRIP Access Point Angler Intercept Survey (APAIS) transitioned to Atlantic state conduct of field data collection with central administration, coordination, and data processing for Maine through Georgia provided by ACCSP staff in 2016 and the MRIP For-hire Telephone Survey (FHTS) and Large Pelagics Telephone (LPTS) Add-on followed in 2020. The survey on the Atlantic Coast of Florida is also conducted by the state, but is coordinated along with the Gulf of Mexico coast by the Gulf States Marine Fisheries Commission (GSMFC). As the MRIP continues the transition from research and development of new data collection methodologies to implementation of new surveys, the ACCSP's Recreational Technical Committee (RTC) of state, council, Commission, and federal partners has developed this implementation plan in response to regional needs on the Atlantic Coast. This plan will guide MRIP in allocating resources to further improve its program to best address data needs of fishery assessors and managers in the Atlantic Coast region.

Baseline Assessment of Current Regional Data Collection Programs and Data Needs

MRIP General Survey

The MRIP is a data collection program that uses several regionally designed sampling surveys to collect representative data and produce statistically robust estimates of recreational fishing effort and catches. Complementary surveys covering recreational fishing for finfish in marine and estuarine waters by shore, for-hire and private boat anglers comprise the general survey design of the Atlantic Coast MRIP. The Fishing Effort Survey (FES) and For-Hire Telephone Survey (FHTS) provide data to produce angler effort estimates (trips per angler) and the Access Point Angler Intercept Survey (APAIS) provides individual angler catch data to produce average catch rates by anglers. The two survey products are used to produce total catch and effort estimates by shore, for-hire and private boat anglers. This general survey design is conducted through a combination of the ACCSP, GSMFC, Atlantic States, and federal contractors in Maine through Florida.

The main products of the MRIP general survey are bi-monthly catch estimates of all species encountered in the APAIS by state. Precise annual estimates of landings and discards are adequate for stock assessments of managed species for commonly encountered fishes. However, annual estimates at state and regional levels may lack adequate precision for species that are rarely intercepted in the general survey. For example, deep water fishing trips which target less common fish such as Tilefish, offshore of southeastern states, are rarely intercepted by the APAIS and so consistently precise catch estimates may not be available

over a long time series. These bi-monthly and annual catch estimates may not be timely nor precise enough for monitoring and management of recreational fisheries with Annual Catch Limits (ACLs); however, bi-monthly estimates may be used to predict whether an ACL will be met before the end of a fishing year. Although the MRIP surveys are not intended or designed to provide in-season quota monitoring, more precise estimates on a shorter time scale (both sampling and production of estimates from data) would provide higher certainty in managing fisheries with established ACLs.

For-Hire Recreational Fishing Components of Atlantic MRIP

In addition to shore and private/rental boats, the APAIS is a dockside survey of anglers who had fished from for-hire charter boats. Surveys of headboats (i.e., party boats) are conducted at sea, not dockside. The Atlantic APAIS includes at-sea headboat angler interviews to obtain the standard APAIS angler interview data and detailed discarded fish data. The APAIS interviewer rides the headboat, observes anglers while they are fishing, and identifies, counts, and measures discarded fish. This protocol was adopted on the Atlantic Coast in 2005 following a year of preliminary testing and a pilot study in South Carolina.

Both sectors of the for-hire recreational fishery (i.e., charter and headboats) have angler effort estimates produced from a list-directed weekly telephone survey of the for-hire vessel operators, the For-Hire Telephone Survey (FHTS). This telephone survey replaced the Coastal Household Telephone Survey (CHTS) for these sectors in 2004 and provides precise estimates of angler-effort by the same bi-monthly sampling periods, by state. In the Southeastern States (NC to FL), the headboat sector of the FHTS is replaced by a special survey program of NOAA Fisheries, the Southeast Regional Headboat Survey (SRHS). The SRHS utilizes a census logbook reporting method to produce bimonthly estimates of catch and effort for this portion of the for-hire fishing fleet.

MRIP General Survey Components – Issues for Future Attention

APAIS coverage of for-hire fishing sector: charter and headboats

Current APAIS sampling levels are adequate to produce precise annual regional catch estimates of many state managed species based on recommended levels of precision identified as standards by the ACCSP. For specific state fisheries, some states conduct additional assignments not funded through the MRIP to reduce variances of the catch estimates (as measured by Percent Standard Error (PSE)), including Massachusetts, Rhode Island, Delaware, North Carolina, and South Carolina. The ACCSP had historically funded additional at-sea headboat assignments from New Hampshire to Florida since 2015; however, this ended for all states other than Florida beginning in 2020. Several states also conduct additional headboat assignments, including New Hampshire, Massachusetts, Rhode Island, New York, New Jersey, Maryland, North Carolina, and Georgia. Beginning in 2021, Atlantic states from Maine to Georgia increased the number of APAIS assignments sampled by 30% with the target of improving estimate precision for all species but mainly targeting offshore ones. Analyses to quantify effectiveness of these additional assignments may be beneficial in future years.

Currently in the modes sampled by the APAIS dockside survey, catch per unit effort (CPUE) information for discarded catch is based on angler recall of the number of each species released by each angler intercepted, and the accuracy of that recall at the dock is unknown. Furthermore, dockside intercept surveys

are inadequate for collecting information about the size and condition of fish released at sea, which are critical data needs for stock assessments. APAIS protocols for at-sea sampling are adequate for headboats but, due to small fleets and higher costs, the number and variety of vessels eligible for at-sea observations of discards is small. APAIS protocols do not allow for at-sea sampling observations from charter and private boats. Without adequate data from those sectors on areas and depths fished, it is unknown whether the length frequency of discards observed from headboats is representative of the entire recreational boat fishery.

Fishing Effort Survey (FES)

Fishing effort for shore and private boat mode angling from Maine to Florida was historically collected through the CHTS. However, it was determined that the CHTS was potentially biased and inefficient due to low response rates and response bias. As more people abandoned landlines for cellphones, a growing number of potential respondents became unreachable. For this reason MRIP transitioned to the extensively tested FES in 2018. The FES is a mail survey that utilizes state recreational saltwater fishing license databases to target licensed anglers and the U.S. Postal Service address database to distribute surveys to unlicensed anglers.

For-Hire Telephone Survey (FHTS)

The FHTS replaced the CHTS of the MRIP and focuses specifically on estimating the numbers of angler trips in the charter boat and headboat fishing modes. The FHTS has resulted in improved effort estimates for charter and headboat modes of fishing, which has improved overall precision of catch estimates for the charter fleet. However, non-response rates in the FHTS remain a concern and mandatory federal vessel trip reports (VTRs) in the North Atlantic are used for the effort component of the final MRIP estimates at the end of the year for the part of the fleet that reports via VTRs. The time lag of annual inclusion due to data availability contributes to potentially inaccurate preliminary for-hire catch estimates for some species.

Atlantic states from Maine to Florida maintain the MRIP online Vessel Directory. Maine to Georgia complete calls via the ACCSP-hosted Assignment Tracking Application (ATA) which houses a Computer Assisted Telephone Interviewing system (CATI) and Florida conducts the FHTS in coordination with the GSMFC.

If current FHTS survey methodology meets data monitoring needs for sector management options in for-hire fisheries, it could be possible for for-hire fisheries to be managed as a distinct sector with their own allocation. Tracking ACLs requires timely and precise data and an ability to monitor catch at the individual vessel level. For this reason, the ACCSP has identified increased timeliness of catch and effort estimates as a high priority. Electronic logbooks have the capability to produce more timely catch and effort data with dockside validation. The Mid-Atlantic Fishery Management Council (MAFMC) implemented mandatory electronic logbook reporting options for federally permitted charter and headboat vessels in 2018 and the South Atlantic Fishery Management Council (SAFMC) and New England Fishery Management Council (NEFMC) followed in 2021. These changes increase the overlap with the current FHTS. Modifications to the FHTS may be necessary to reduce reporting burden in overlapping data collection programs.

Special Surveys and Data Collection Programs

Highly Migratory Species

Highly Migratory Species (HMS) are federally managed billfish, tuna, and sharks that range along the entire Atlantic and Gulf of Mexico regions. NOAA Fisheries directly manages these species since they range

across regional boundaries in US waters. A summary of the HMS-targeted data collection programs along the Atlantic Coast is provided below.

MRIP Large Pelagic Survey (Large Pelagic Intercept, Telephone, and Biological Surveys)

The Large Pelagic Survey (LPS) began in 1992 as a specialized survey program of rare event HMS species in support of domestic management and international treaties. The LPS includes several surveys: a targeted angler intercept survey, the Large Pelagic Intercept Survey, which is similar to the APAIS but only intercepts recreational and for-hire fishing trips which targeted HMS species; the Large Pelagic Telephone Survey, which is a list-frame sampling survey to produce angler effort estimates in the HMS/LPS fisheries; and the Large Pelagic Biological Survey, used to obtain biological samples for life-history parameter estimation, such as age, size, and sex distribution, as well as reproduction parameters. The collective surveys collect information to identify fishing effort and catch (harvest and discard) from vessels holding HMS permits, and is conducted from Maine to Virginia during the months of June through October.

HMS Catch Card Census – Maryland and North Carolina

Highly Migratory Species Catch Card Census programs began in 1998 to improve reporting compliance required of for-hire licenses or HMS permits, and to identify catch (harvest and discard). Two states have chosen to implement these census programs and are essentially the same in each state. The programs include private anglers as well as for-hire charter and headboat operators from Maryland and North Carolina holding a Charter/Headboat HMS permit. All recreationally landed Bluefin tuna, billfish, and swordfish must be reported via a catch card, regardless of waters fished (state or federal). Reporting of Bluefin tuna dead discards is also required, while the Maryland Catch Card program also collects data on shark landings.

HMS Catch Reporting Program

The HMS Catch Reporting program is used to identify harvest and dead discards of Bluefin tuna, as well as harvest of billfish and swordfish. This program operates from Maine through Texas and the Caribbean territories, covering private anglers as well as for-hire headboats and charter vessels holding Atlantic HMS permits for fishing in federal waters. Any vessel landing one of the species listed above is required to report their catch within 24-hours after the end of the trip via an online reporting system on the HMS permits website, the HMS Catch Reporting Smartphone App, SAFIS eTrips, or telephone.

Atlantic HMS Tournament Registration and Reporting System (ATR)

All tournaments offering rewards or prizes for the catch or landing of Atlantic HMS are required to register with NMFS within 30 days of the start of the event, and must report all catch and the number of participating vessels for each day of the event within seven days of the completion of the event. Registration and reporting may be done via the online ATR portal, or via paper forms provided for download on the NMFS website. Data collected via the ATR system is used for ICCAT reporting purposes, and is one of the primary data sources for tracking the 250 billfish limit (included blue and white marlin and roundscale spearfish) imposed on the U.S. Atlantic recreational billfish fishery by ICCAT.

For-hire Logbook Programs

The following items provide additional information on ongoing for-hire data collection programs along the Atlantic Coast associated with logbook reporting requirements.

These data collection programs utilize logbooks for reporting details of individual recreational fishing trips in the for-hire fishery on the Atlantic Coast. Federally required (mandatory) reporting is linked to specific fishery management plans (FMPs) and permits to participate in the specific fisheries (e.g., groundfish through the Greater Atlantic Regional Fisheries Office (GARFO)). Individual state logbook reporting programs may be comprehensive in scope or limited to fishery-specific data collections.

GARFO Vessel Trip Reporting For-hire Logbooks

Commercial and for-hire operators participating in New England and Mid-Atlantic fishery FMPs are required to report results of all fishing trips via VTR, a mandatory trip-reporting logbook data collection program administered by NOAA GARFO. Trip reports are required to be submitted within 48 hours. VTR data are incorporated into the final estimated effort, by wave, after year-end and have been incorporated into preliminary MRIP bi-monthly effort/catch estimates since 2017.

Southeast Region Headboat Survey (SRHS)

The SRHS was implemented in the South Atlantic in 1972 and extends from North Carolina through east Florida. The survey focuses on producing landings and effort estimates from the federally permitted headboat fishery targeting offshore reef fishes. This data collection program includes mandatory electronic trip reporting by headboats on a weekly basis along with a dockside intercept program to validate reporting and obtain biological samples for age, growth, and reproductive parameters used in stock assessments. Federal regulations require only federally permitted boats to report to the SRHS so headboats without federal permits are not included. Headboats which do not have a federal permit are also not included in the FHTS an so there is a potential gap in coverage.

The APAIS headboat at-sea sampling component is conducted in the same region as covered by the SRHS although MRIP does not produce landings estimates for use by stock assessment or management for this fishery sector. The primary objective of the APAIS headboat sampling in the South Atlantic is to obtain live discard size and species composition from observed fishing, rather than species composition and number from logbook reported data with no information available on size or condition of discards. These two data collection programs overlap but the trip reporting in logbooks and voluntary participation in the at-sea APAIS headboat sampling does not constitute duplicative reporting burden.

Maryland Charter Fisheries Logbook

The Maryland DNR charter logbook began in 1995 as a mandatory weekly reporting program for charter boats fishing for Striped Bass in Chesapeake Bay only. This program was modified to include reporting by vessels and/or captains holding several recreational fishery permits in MD: The Chesapeake Bay & Coastal Sport Charter Boat License, the Maryland Commercial Fishing Guide License, and/or the Maryland Unlimited Tidal Fish License. These permits and reporting requirements cover all species in the Chesapeake Bay and

coastal Maryland waters. This program collects variables to determine fishing effort, and harvest, including weights from landed fish and catch disposition (e.g., released, landed, kept, regulatory release, etc.). Vessel operators are required to submit trip level reports on a weekly basis.

Maryland DNR provides the trip data to MRIP for those vessels selected in the FHTS to be used for effort estimation in lieu of telephone survey responses by Maryland vessel operators (who are not called by the FHTS). Maryland ocean-side for-hire vessel operators holding a federal for-hire vessel permit are required to submit VTRs to NOAA as well as the state reporting requirements. Hence, there is the likelihood of duplicative reporting by Maryland for-hire vessels fishing in coastal Atlantic waters.

Other State For-Hire logbook programs

The following state logbook programs cover for-hire vessels in varying scope of vessels and fisheries in paper or electronic reporting forms. They are referenced here as areas for future coordination and possible integration if later certified by MRIP. Currently (2022), none of these are used in MRIP estimation:

- Rhode Island DFW via SAFIS eTrips and eLogbook
- Connecticut Party and Charter Vessel Black Sea Bass Program
- New York State Vessel Trip Reports via SAFIS eTrips
- New Jersey Striped Bass Bonus Program
- Virginia Cobia Permit Reporting Program & February Black Sea Bass Reporting Program
- South Carolina For-hire Logbook

Other logbook programs

- MAFMC Recreational Tilefish Permitting and Electronic Reporting

Other Recreational Data Collection Programs

State Reef Fish Survey (SRFS)

The SRFS is a specialized recreational fishing survey, certified by MRIP, which provides data needed to manage and assess reef fish stocks in Florida. The SRFS has an in-person interviewing and mail components which provide information and is required for recreational anglers and spear fishers who intend to fish or harvest a specific list of reef fishes[1] from private boats.

Southeast For-Hire Integrated Electronic Reporting (SEFHIER) Program

[Pending addition from SERO staff]

[1] Mutton Snapper, Yellowtail Snapper, Hogfish, Red Snapper, Vermillion Snapper, Gag, Red Grouper, Black Grouper, Greater Amberjack, Lesser Amberjack, Banded Rudderfish, Almaco Jack, and Gray Triggerfish

Atlantic Regional Implementation Priorities to Meet Data Needs

The ACCSP RTC developed a prioritized list of regionally important data needs, which were reviewed and approved by the ACCSP Coordinating Council.

1. **Improved precision (PSE) and presentation of MRIP estimates**
2. **Comprehensive for-hire data collection and monitoring**
3. **Improved recreational fishery discard and release data**
4. **Improved timeliness of recreational catch and harvest estimates**
5. **Increased utility of citizen science**
6. **Biological sampling for recreational fisheries separate from MRIP**
7. **Improved in-season monitoring**

Each priority is described below in detail to provide justification for the regional importance along with the approach for implementation and where possible, the estimated annual costs. Some priorities have associated MRIP-certified methodologies and some are included for purposes of discussion and future research. ACCSP will continue to update this plan as new methods are certified or as regional priorities change. There may be a need to balance priorities with costs and therefore to address issues in a different order. Costs of implementation may come in a form of tradeoffs other than dollars. With the move to cumulate estimates via the MRIP Recreational Fishing Survey and Data Standards in 2020, cumulative estimates throughout the year (e.g., January – July) will generally have lower PSEs than that of a single month's estimates. That is, if focusing on cumulative estimates throughout the year, each additional month might result in lower PSE as the year progresses and so the trade-off between smaller sample size (and thus likely higher PSEs) for a single month may not be as relevant. However, if individual, monthly, estimates are desired, the trade-off between PSE and timeliness are still a concern.

Improved precision (PSE) of MRIP catch estimates

For many managed species on the Atlantic Coast, MRIP estimates are reasonably precise at the annual and regional scale for interjurisdictional stock assessments. Inshore species that are frequently encountered in the APAIS survey also have reasonably precise state-level estimates for use in single jurisdiction assessments. PSEs above 50% are not presented according to the 2020 MRIP Standards. Current estimates are not precise enough to meet fisheries management needs for some species.

Redefining sample strata spatiotemporally to better focus on species poorly represented using the existing survey methods would result in decreased PSE for rare event (e.g., Blueline Tilefish, Red Snapper, etc.) and pulse fisheries (e.g., Cobia, tuna, and billfish). Specialized surveys should also be considered, designed, and certified to address these particularly problematic species. For example, alternative catch and effort surveys are necessary to track the ACL for Red Snapper over the harvest season which occurs over a period of days. Also, LPS and HMS catch card programs are an alternative method implemented to address low precision estimates for billfish and tuna. Methods should be developed to collect data from private anglers on species not sufficiently encountered by APAIS to develop precise-enough estimates through other means. As the need for reliable estimates increases for managed species under quotas, alternative survey methods could be developed for MRIP certification with a regional framework that is scalable.

Managed species with chronically high PSEs and/or very small ACLs should be prioritized for improvements. Historically, attempts to reduce PSE have primarily focused on increasing sample size; however, ACCSP recommends that future resources be focused on investigating targeted sampling design changes, alternative estimation approaches, and methods to optimize sampling effort (with strategic allocation of samples at existing or increased levels) to reduce PSEs to acceptable levels. Beginning in Wave 5, 2020 for some states but fully implemented in 2021 due to a lag in deployment caused by COVID-19, the Atlantic APAIS was increased by 30% from funding provided via the Modern Fish Act (MFA).

Biological stock boundaries often do not coincide with state boundaries used to pre-stratify the MRIP APAIS and FES (e.g., the northern and southern Black Sea Bass stock split at Cape Hatteras, the Gulf of Maine and Georges Bank stocks of Atlantic Cod, the Long Island Sound management unit of Tautog, the Gulf and Atlantic stocks of many species separated at the Florida Keys). As a result, precise estimates of recreational removals for both input to stock assessments and annual quota monitoring would be beneficial to have at a finer scale and often with different boundaries than in MRIP's pre-stratified design.

There are several approaches to resolving this issue: (1) increase sample size to allow for more precise post-stratified estimates; (2) distribute base number of assignments to pre-stratified sub-state regions (as some states already do); and (3) further stratify the survey around important biological boundaries, which may require changes to the survey sampling schedule.

Post-stratification is the simplest approach, and methods to improve precision would also help improve the usability of finer spatial scale estimates. However, some boundaries cannot be resolved with post-stratification. For example, Monroe County (the Florida Keys) straddles two federal fishery management council jurisdictions and is a stock boundary for many assessments in the Gulf of Mexico and Atlantic. Currently in MRIP, all effort and catch for this county is assigned to west Florida estimates regardless of waters fished (note: Monroe County, Florida estimates are post-stratified for Black Grouper, Gag, Greater Amberjack, Mutton Snapper, Yellowtail Snapper, Blueline Tilefish, Nassau Grouper, Goliath Grouper, Snowy Grouper, and Red Grouper). Although county-level estimates of landings and discards may be post-stratified to reassign to the Atlantic, there is often a need to develop estimates of removals from this county by area fished (Gulf and Atlantic), and this is not possible with the current MRIP design. A combination of methods may be required to fully resolve this issue for all recreationally important species.

A related issue is the development and presentation of post-stratified estimates. Currently, MRIP offers SAS template programs to allow users to define custom domains to post-stratify estimates along appropriate biological or management boundaries. Developing web tools to allow users to obtain custom estimates, or estimates for a standardized set of regions with standardized, pre-defined boundaries, with the appropriate calibration factors applied, would improve usability and transparency of these estimates for use in stock assessments and the management process. These could be provided to all users through the current MRIP interface, or to a subset of more advanced users through the ACCSP Data Warehouse interface.

Comprehensive for-hire data collection and monitoring

For-hire catch and effort estimates combine distinct data collection methodologies for effort (FHTS) and catch (APAIS) with a validation component. This provides adequate coverage for commonly encountered species on an annual basis. However, FHTS and APAIS overlap with other mandatory reporting requirements

vary by jurisdiction, such as federal VTRs, SRHS, and state or regional logbook programs. Some data streams are not fully integrated into MRIP estimates (preliminary and/or final). The current system has been criticized for increased reporting burden on captains, lack of integration of data collection to produce catch statistics, and under coverage of pulse fisheries and deep-water species.

Recent changes in fishery management practices have further strengthened the argument for the use of logbooks in the for-hire sector. The NEFMC, MAFMC, and SAFMC have implemented mandatory electronic for-hire reporting requirements to improve reporting. Federally permitted charter vessels are required to submit fishing activity via electronic logbooks within 48 hours of a fishing trip (NEFMC/MAFMC) or within 7 days of a fishing trip (i.e., weekly; SAFMC). These actions have allowed for logbook data collection to monitor both catch and effort data within the federally permitted for-hire sector.

ACCSP supports development of MRIP certified logbook programs with validation as one method to monitor catch and effort in the for-hire fishery. Logbook compliance with reporting requirements depends on effective outreach and enforcement mechanisms; however, logbook programs may not always be practicable due to legislative or regulatory hurdles or may not be preferred by fisheries managers, necessitating reliance on statistically-valid surveys instead. The critical need along the Atlantic Coast is to eliminate duplicative, often overlapping, for-hire fishery reporting programs. A Comprehensive For-hire Data Collection Program with full, but not duplicative, coverage of both federally and the many non-federally permitted boats needs to be implemented. Non-federally permitted boats includes vessels that fish exclusively in state waters or for fishes not currently regulated via permits that have reporting requirements.

To meet future data collection and fishery monitoring needs, data collection must be timely, precise, cost effective, and minimize the reporting burden on captains and anglers. The ACCSP recommends this Comprehensive For-hire Data Collection Program be developed to ensure minimal reporting burden and to leverage data sharing among federal and state programs. Coverage shall include headboats and charter boats fishing in both state and federal waters, and methods may include logbooks where feasible, and alternative approaches to data collections for fishery monitoring where logbooks are not feasible or practicable. The implemented program should follow MRIP certified designs for logbooks with validation or sampling surveys.

In an effort to draft an Atlantic Comprehensive For-hire Data Collection Program, the RTC updated the ACCSP Data Standards with a set of minimum data standards for for-hire reporting and, with consultation from NOAA Fisheries, created a document for eventual MRIP certification detailing the use of census logbook data with validation. This certification methodology was identified as the first step in working towards the ability for for-hire recreational estimates to be calculated either through survey or census logbook. The RTC and NOAA Fisheries will continue to update the data standards and to progress within the MRIP certification process.

Recognizing various federal logbooks are in development or being modified for implementation, the Atlantic region needs completion and certification of a method to validate logbooks and develop correction factors to utilize logbook effort and catch in MRIP estimates. The new program shall meet the needs of statistical estimation, stock assessment, and fisheries management.

Improved recreational fishery discard and release data

In response to stock declines, fishery managers have taken regulatory steps to reduce harvest in the recreational sector, including increased size limits, reduced bag limits, and reduced recreational fishing seasons to ensure harvest levels do not exceed management targets. This has translated into a growing portion of recreational catch that is released at sea and unavailable for direct observation in dockside surveys. Numbers of discarded fish and accurate species identification of discarded fishes are more difficult to obtain with precision than harvested catch, due largely to the fact that current methods rely on angler recall.

Proper identification of discarded species is a requirement for any type of estimation of released fish. Studies have shown anglers have varying ability to identify their catch, including a study on the Pacific Coast that demonstrated anglers could reliably recognize Pacific Halibut and Sand Bass (unique body morphs without similar conspecifics) but had difficulty with rockfishes which encompass many species which are very similar in appearance. The Atlantic Coast region has similar species identification issues with flounders, kingfishes, sharks, and some reef fishes. Lack of angler expertise in proper identification of species requires they be reported at family or genus level groups. These grouped discarded species must be delineated into their constituent species prior to stock assessment to provide accurate and complete counts of all discards of a particular species. There is no standard method and little supplementary information to aid in these delineations. Given the regulatory status and differential stock health within these species groupings, accurate identification is paramount for holistic management. Supplemental surveys to ascertain the makeup of species within these groups should not be the only method for improving discard identification. Distribution of taxonomic keys or other fish identification guides or tools for these species, and an increase in angler education and outreach about proper fish identification, should be a priority part of any improved program for discarded fish identification, enumeration, and biological data collection.

The Atlantic APAIS has included a protocol specific to for-hire headboat at-sea discard monitoring and angler interviewing since 2005 wherein state interviewers directly observe recreational anglers as they fish on headboats and collect information on the species composition, size, and release condition of discards. Based on the success of projects funded to date, the use of at-sea observers in the headboat fishery has proven to be a viable method for collecting accurate data on discards that fills important data gaps in stock assessments. However, headboat sampling could be improved with an expanded frame of active, eligible vessels participating (currently voluntary participation within the APAIS), and an increased number of headboat fishing trips sampled. The ACCSP supports and recommends improvements to the current headboat at-sea sampling program to include more robust sample sizes to support better precision of discard rates and composition, and improved outreach efforts to increase participation by eligible headboats throughout the Atlantic Coast.

Discard data from headboat mode is not necessarily representative of other modes. More information is needed for charter, private/rental and shore mode discards. While addition of observers might be too costly at this time, one modest improvement would be inclusion of depth fished in the intercept. The APAIS collects coarse trip-level data on the primary area fished (inland, state territorial seas up to 3 miles from shore, or federal waters greater than 3 miles from shore) but does not provide data on the depth fished. These data are critical for determining depth-dependent discard mortality for released portions of recreational catch.

Improved timeliness of recreational catch and harvest estimates

There are two aspects of timing to consider regarding recreational catch and harvest estimates: the unit of estimation (i.e., month, two-month wave, cumulative, annual) and how quickly estimates are

generated after an estimation period has ended. State and Commission managed species would benefit from monthly estimates to set seasons, especially in northern areas where fish may only be active during one month of a two-month wave, or for ephemeral fisheries where a species may pass through and be available for only one month (e.g., Cobia). This could be especially important to for-hire fishery captains as it could assist business planning. Also, even though MRIP was not designed to track ACLs, having more refined temporal estimates could help reduce gaps or buffers set between ACLs and Annual Catch Targets (ACTs), allowing anglers to harvest more fish by reducing uncertainty in landings. Both the 2016 and 2021 National Academy of Science (NAS) Review recommended additional evaluation of the cognitive properties of the two-month recall period, and a shorter estimation period would likely reduce any recall bias. APAIS data collection is already amenable to monthly recreational estimates and the FES was found to not have significant differences between one- and two-month recall periods (Andrews et al., 2018).

In terms of how quickly estimates are generated, currently annual estimates of catch and harvest are often not available until April of the following year and wave estimates are not available until 45 days after the completion of a wave. Improving the timeliness of recreational catch and harvest estimates could help fishery managers better predict when seasons need to be closed before landings are exceeded. Managers would also have more time to develop management options before decisions for an upcoming season must be made if a reduction in the lag time is achieved. Electronic data collection of both the APAIS and FHTS in 2019 and 2021, respectively, has allowed for quicker access to raw data for use in the estimation process and also improved the quality of data.

The trade-off between the additional cost of moving to monthly waves and/or faster turn-around time for generating estimates should be evaluated against budgeting for improved precision at the current two-month/annual levels and other recreational data priorities. Moving to one-month waves without additional sampling could result in monthly estimates of sufficiently low precision that having monthly estimates does not actually improve management. Andrews et al. (2018) discerned that, while there was no significant difference in effort estimates between a feasible one-month alternative to the FES and the current FES, multiple reference periods in a single survey may reduce bias for one-month estimates. In determining trade-offs of effort survey design, Andrews at al. (2018) recommend consideration be given to estimate precision, sampling requirements needed to support different levels of resolution, and also the impact of increased sampling on survey costs.

Biological sampling for recreational fisheries separate from MRIP

Fishery-dependent monitoring programs on the Atlantic Coast which collect vital statistics on catch and effort from the recreational fishery do not provide some of the critical data inputs needed for age-based stock assessments. The MRIP is the only dedicated large-scale fishery dependent program that monitors private and for-hire charter boat-based segments of the recreational fishery. The MRIP strives to provide a statistically valid sample of the size composition and biomass of harvested finfish that is representative of the spatial and temporal distribution of the recreational fishery. However, for many important managed species, the MRIP survey intercepts low numbers of landed fish, particularly for species with strict harvest limits, such as Red Snapper, or that are targeted by a small subset of participants in the overall recreational fishery, such as tilefishes and deep water grouper species. Furthermore, time constraints and strict interview procedures of the APAIS do not allow field interviewers to collect age structures or record sex from fish sampled.

Coast-wide methods to supplement data collected through the APAIS are needed to collect length, weight, age structures and sex ratios from managed species that are representative of current recreational landings. Supplemental survey(s) could be focused on intercepting trips with catch and maximizing biological samples, whereas the APAIS would continue to be the primary data source for catch-per-unit-effort. The supplemental survey(s) should also allow for the collection of trip-level data on area fished, depths fished, fishing methods, and characteristics of discards (numbers by species, proportions under legal size limits, immediate mortalities, and notable impairments).

Increased utility of citizen science

Angler-reported recreational fishing activity and catch continues to be an evolving aspect of engaging citizens in fisheries management and science and in helping to bolster the breadth of data collection for state, federal, council, and Commission partners. While productive for agency-public relationships, the vast majority of data collection tools (i.e., mobile applications) have not yet followed a standardized approach to data collection. A number of partners in the South Atlantic (e.g., 'Release' by the SAFMC and 'Catch U Later' by NC DMF) have collaborated with ACCSP to create these mobile-based applications on the Atlantic Coast and there are continued plans to further standardize data standards/elements. This could include the use of a 'switchboard' base application which can have a standard set of questions/responses to choose from for numerous partners – this would allow for different questions/responses to be submitted in the same format and data stream(s) but to be flexible depending on partner needs.

A more standardized approach to data collection via opt-in angler applications would provide more useful data for use in stock assessments by assuring data are collected in the same manner, regardless of where the data are being collected which in turn could allow for data users to potentially include opt-in angler reported information into the recreational fishery management process for estimation and management. Another major factor to be considered is the communication and outreach required to begin and maintain engagement from a broad segment of the angling public.

Improved in-season monitoring

Stock assessments may partition fishery removals into seasons or redefine calendar years into fishing years. Fishery managers also require precise estimates of landings and discards over time periods that better match the scale of the recreational fishery. For example, for federally managed species with an ACL that cannot be exceeded, recreational fisheries have demonstrated the capacity to exceed limits well before the end of a full year. Thus, annual seasons have been reduced and precise estimates are now needed over much shorter periods (in some cases weeks or days) to ensure that ACLs are not exceeded and overfishing is not occurring. Increasing precision of estimates within waves may be necessary for species where the unit of analysis has a temporal scale less than a year.

The MRIP is intended to be a general survey and is therefore not designed for the purposes of in-season management of recreational fisheries with ACLs. Improving timeliness of estimates is one feasible method to improve ability to monitor in-season estimates but the cost of increasing sample sizes to produce precise enough estimates is high. Additionally, it's possible that a different approach to management, rather than data collection method and/or supplemental surveys, would be more useful for species with small seasons and/or rare occurrences.

The 2021 NAS review of MRIP yielded several suggestions to assist with improving in-season monitoring including: using raw data streams of MRIP data, mode-based projecting and/or forecasting, further implementation of new technologies to better collect data, and using supplemental and ancillary data. Additionally, new recreational surveys and survey methods could be implemented but partners should anticipate the need for possible inter-calibration and continued survey development, ensuring that these needs are also clearly communicated to anglers, managers, and stakeholders. It will also be beneficial to continue pilot testing new approaches including possibly the use of harvest tags used to track the harvest of individual fish or private recreational fisheries license endorsements to identify a subset of licensed anglers to better target managed species.

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Atlantic Coastal Cooperative Statistics Program

Coordinating Council

May 2, 2022

Methodology for Logbook Estimates of Catch and Effort with Dockside Validation

Summary: This document is provided to the Coordinating Council for awareness of progress and opportunity to comment. It was developed through the Recreational Technical Committee and will be submitted to MRIP for their consideration, and response under the process to certify new methodologies. Note the certification process is iterative, and the process can take significant time. Also, ACCSP understands that logbook programs currently collecting data may not exactly fit the proposed design. It is expected that changes to the design will be made as needed to support the statistical, logistical, and other considerations are discussed. This document builds on a pilot study in SC (2016) and the Atlantic implantation of APAIS tablets in 2019.

Background: Priority 2 in the Atlantic Recreational Implementation plan is to develop a comprehensive For-hire data collection program. The desire for a new methodology would be to use For-hire logbooks to the greatest extent possible, at the same time maintaining data compatibility for fishing activity by vessels with a certified trip report (logbook) and those vessels and fishermen that do not have a logbook reporting requirement. The current For Hire Survey methodology is not included in this document, as it is already implemented and is expected to continue. The new methodology proposes extending the use of logbooks for both effort and catch information, dockside validation via the MRIP APAIS, and new estimation procedures. The vision of the comprehensive for-hire data collection program is to have each vessel as part of either the certified logbook frame, OR the for-hire survey (FHS) frame, and the catch totals from the logbook and survey frames can be combined for a robust estimate of for-hire fishing across state and federal jurisdictions. The design is intended to be flexible enough for jurisdictions to implement logbook data collection at different points in time, or not at all.

The MRIP design certification is a significant step in working toward implementation of data collection, parallel data collection with existing methods, transition plans and eventual use of the data from a new design. MRIP core surveys also follow this process, including APAIS new design implemented in 2013 and FES new design implemented in 2018. More information on the MRIP design certification process can be found here: https://www.fisheries.noaa.gov/recreational-fishing-data/recreational-fishing-survey-design-certification

Methodology for Logbook Estimates of Catch and Effort with Dockside Validation

Preparation for MRIP Certification

Atlantic Coastal Cooperative Statistics Program:

Recreational Technical Committee

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Dukes, A., Floyd, B., Hiltz, E., and G. White. 2017. Use of APAIS Intercepts to Validate Logbooks and Calculate Combined Estimates of Catch, SC For-Hire Logbook Validation Project, Final Report, Charleston.

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Logbook Data Collection: Design and Standards

Data Submission

Each vessel and every for-hire trip will be recorded in order to achieve the goal of capturing a mandatory census survey (as close to complete for-hire information from the logbook frame as possible). Data collection must be electronic (with paper forms as backup) and all logbook data will be collected via a dynamic user interface such that all required data elements for the permitted program(s) are presented to the respondent.

To assure observational independence, a trip start designation will be required before leaving the dock and a trip stop designation required before offload. Designations are electronic timestamps which are not editable by data collectors. To end and submit a trip, data collectors will be required to use a 'trip stop' option which can only be selected once all relevant data elements are finalized. Once submitted, trip and catch data elements cannot be edited. Trip information would remain on data collection tool (i.e., tablet, phone) to allow data submitters to review data post-submission and requests for changes could be made to relevant partners for editing. Data will be submitted at least weekly and up to 48-hours after the end of the week (e.g., due Tuesday after a Monday-Sunday week). Did Not Fish (DNF) reports would be mandatory for active vessels with daily-level detail, submitted at least weekly. Inactive vessels would be able to identify periods of inactivity seasonally/annually.

Logbook Frame

Vessel Directory

The National Oceanic and Atmospheric Administration (NOAA) maintains the Marine Recreational Information Program (MRIP) Site Register (https://www.st.nmfs.noaa.gov/msd/html/siteRegister.jsp) real-time website which houses public access sites along the U.S. Atlantic Coast and, for designated state representatives, a Vessel Directory (VsD) of an extensive list of for-hire vessels. Vessels are added, edited, and retired by federal and state representatives while being routinely updated. These updates include the matching of fishing permits with existing vessels and/or the addition of new vessels to match new permits. Currently, this is limited to HMS and GARFO Federal VTR permits; however, additional partner permit could be added at a later time.

The VsD requires all vessels have a status, used to determine if a vessel is currently eligible/active, retired, or in draft, and are assigned a unique vessel identification number (Vessel ID) to prevent duplication. Each vessel must also have a number (State Registration Number or U.S. Coast Guard Documentation Number) and for-hire designation as either charter or headboat. To be approved within the VsD, vessels must also have at least one active site (or site placeholder if trailered), activity in at least one month within a year, a primary contact person, and a phone number of the primary contact. In addition to required fields, the VsD houses broader information about the vessel, the access site(s), contact(s) information, registration(s), and federal for-hire and HMS permits.

Frame Definition

The logbook frame will be populated with vessels which have permits associated with a certified program design. Permits are or would be housed within the VsD and used, together with the permit's dates of activity, to determine if a vessel would have its logbook data used for the entirety of a sample Wave.

Within a given Wave, a distinct vessel can only occur within a single frame, either the logbook or survey frame. For-hire vessels within the survey frame would consist of vessels without a certified mandatory logbook and would report their activity through existing MRIP surveys of fishing effort (For-Hire Survey (FHS)) and catch (Access Point Angler Intercept Survey (APAIS)). Vessels may change between frames by wave. For instance, if a vessel's federal permit, which met certified program design, expired within a state that did not have a certified program design for state logbooks, it would be moved from the logbook to survey frame for that Wave. Changes cannot be applied on any finer scale than wave level to maintain the FHS survey design selection procedures.

Validation

Validation of logbooks (e.g., date, start/end location, vessel information) will be accomplished through independent observations of trip activity via a dockside component. Please see 'Dockside Catch Survey' section below for more information.

Reporting Compliance

Logbooks must have accountability measures in place and have compliance tracking procedures developed for missing reports and non-compliance rates; these metrics should be measured at least monthly to ensure a compliance rate of at least 70% is being met. These measures also extend beyond weekly reporting to the timing requirements of DNF reports which can vary in time based on vessel activity. Additionally, consequences for missing, incomplete, or late reports must be established and followed. The use of robust outreach plans is highly recommended to help attain as high of a compliance rate as is possible.

Dockside Catch Survey

Validation of logbook trips will be accomplished through independent observations of trip activity using a dockside catch survey, such as the APAIS. Dockside interviews can be used to validate logbook trip effort and catch information.

Summary of the APAIS and General Survey

The APAIS is a dockside survey of anglers fishing from shore, private/rental boats, and for-hire charter boats conducted on the Atlantic Coast from Maine through Georgia. Data collected includes trip level information, demographic and social information, as well as catch data. Maine through Virginia also perform at-sea sampling to capture for-hire headboat or party boat data on catch and discards. The APAIS is used to produce bi-monthly catch estimates.

The for-hire recreational fishery for charter and headboats sectors have angler effort estimates produced from the FHS, a list-directed weekly telephone survey of for-hire vessel operators. This survey operates from Maine through Mississippi. The FHS is paired with data collected through charter and headboat APAIS intercepts to estimate total for-hire catch. This estimate along with the combination of APAIS and the Fishing Effort Survey (FES), used for private boat and shore recreational estimates, is known as the MRIP general survey.

Data Collected

The APAIS collects relevant data elements about trips (e.g., date, time, location, vessel specifics, etc.), effort (e.g., number of anglers, hours fished, gear), and harvested/discarded catch. On the Atlantic and Gulf coasts, interviews are conducted on and submitted via a custom application from hand-held tablets. This application presents exact, current for-hire vessel information (registration number and vessel name) and GPS and date/time snapshots for interviews, both of which help provide strong matching abilities to electronic logbook data. These criteria are used in trip matching methods described below.

Distinct Interview Use

Each distinct APAIS interview can only be used for logbook validation or for survey expansion (when used with FES/FHS). Since this delineation would potentially reduce the number of interviews used in the survey expansion, a more in-depth analysis of methodology to ensure adequate coverage is required. Table 1 illustrates that the use of APAIS as validation for logbooks would lower the sample size of APAIS used for expansion of FHS data by ~30% for the New England and Mid-Atlantic regions for APAIS sampling months (only through September in 2021) in each of the Atlantic states, Maine through Virginia (See Table 6 for months of APAIS sampling by state).

State	2019		2020		2021	
	Before	After	Before	After	Before	After
ME	52	37	27	25	50	42
NH	123	64	71	38	119	85
MA	341	269	248	191	239	210
RI	240	106	231	91	260	128
CT	103	61	38	30	98	86
NY	282	153	221	130	235	143
NJ	225	122	53	43	171	119
DE	83	48	70	55	102	86
MD	279	256	149	146	281	274
VA	145	87	34	29	114	100
Total	1,873	1,203	1,142	778	1,669	1,273

Table 1. Total raw counts of APAIS for-hire trips reported (before) minus vessels matched to VTR trips for total sample size of APAIS used for expansion of FHS data (after) for each state in months of sampling for the APAIS by year. 2019-2020 are full years while 2021 is only up through September.

Supplemental Components

Additional approaches to data collection, such as the State Reef Fish Survey (SRFS[1]) in Florida, have been successfully integrated into the MRIP general survey to supplement sampling coverage. Another approach could also include the use of onboard observers which would allow for further validation of harvested and released alive/dead fish.

Methodology for Catch and Effort Estimates

Vessels in the logbook frame will have both catch and effort data collected and submitted. A portion of logbook data will then be validated to compare logbook data to intercepted trips and catch via difference-based estimation methodology, adapted from methodology from Dukes et al. (2017). This methodology uses the logbook as base data for both effort and catch, and dockside interviews as a correction factor.

Trip Matching

The calculation of effort and catch estimates is reliant on the ability to match self-reported logbook trips and dockside interviews, independent from vessel representatives. Therefore, data elements from both data streams will be used for matching distinct trips via a set of mandatory matching elements for a distinct vessel, via vessel registration or coast guard number. These matches are validated by requiring at least the trip date and location (state, county, and site).

While Dukes et al. (2017) used an algorithm to match data elements between logbook and dockside survey data streams, improvements to surveys (e.g., the APAIS) and existing logbook programs (e.g., NOAA Fisheries Greater Atlantic Regional Fisheries Office (GARFO) Vessel Trip Report (VTR)) allows for better matching. The most important improvements to both logbooks and the dockside surveys is the transition from paper to electronic data collection and submission. This allows for cleaner data collection of real-time vessel information (i.e., exact name/number for a given sampling Wave) rather than manually filled-in data and also improves the timeliness of reporting.

The matching of metrics, shared between a logbook and dockside survey, helps to identify the likelihood of a trip matching within the difference-based estimation methodology (Breidt et al. 2017). Dukes et al. (2017) developed a set of seven weighted metrics (Appendix B); however, updates to data collection streams means more exact matching and,

[1] https://media.fisheries.noaa.gov/dam-migration/09_gulf-reef-fish-survey-decision-memo-with-attachments.pdf

while the matching is still likely not perfect, Table 2 outlines an updated recommendation of relevant matching metrics (note: the weighting has not been updated). These changes included the removal of Distance and Target Species and the adjustment of Trip End Time to a comparison of hours (± 30 minutes), not minutes. Additionally, the Date was removed since the matching of electronic data allows for an exact match. If trips do not match on date, they are removed from the analysis. Additionally, it is worth noting that distinct trips for that day can and will be identified so as to account for multiple trips per day for a given vessel.

Field	Dockside Survey Definition	Logbook Definition	Match Metric Weight
Start Site	Interview site	Site reported as the start site	0.30
Anglers	Number of individuals in the party	Number of anglers reported participating	0.30
Hours Fished	Mean total hours fished of interviewees	Total hours fished as reported	0.10
Trip End Time	Mean interview time	Estimated trip end time	0.01

Table 2. Fields used to compare dockside interviews and logbook trips, amended from Dukes et al. (2017).

Example Matching Rate

Using 2019-2021 federal VTR and APAIS data, we matched the total number of trips by year/month/day and state to compare the matching rate to that of the SC report. This analysis recognizes the reality that not all VTR trips would be intercepted by APAIS, and that not all APAIS intercepted for-hire angler-trips were required to submit a VTR. Summary results below:

	2019		2020		2021	
State	**VTR**	**APAIS**	**VTR**	**APAIS**	**VTR**	**APAIS**
ME	878	52	525	27	507	50
NH	1,154	123	1008	71	589	119
MA	2,521	341	2,322	248	1,834	239
RI	1,738	240	2,050	231	1,325	260
CT	1117	103	797	38	535	98
NY	6,714	282	5,771	221	4,793	235
NJ	6,752	225	6,050	53	4,562	171
DE	944	83	627	70	684	102
MD	717	279	548	149	617	281
VA	930	145	932	34	731	114
Total	23,465	1,873	20,630	1,142	16,177	1,669

Table 3. Total raw counts of VTR reported and APAIS trips intercepted for each state in months of sampling for the APAIS by year. 2019-2020 are full years while 2021 is only through September.

State	2019	2020	2021
ME	1.7%	0.4%	1.6%
NH	5.1%	3.3%	5.8%
MA	2.9%	2.5%	1.6%
RI	7.7%	6.8%	10.0%
CT	3.8%	1.0%	2.2%
NY	1.9%	1.6%	1.9%
NJ	1.5%	0.2%	1.1%
DE	3.7%	2.4%	2.3%
MD	3.2%	0.5%	1.1%
VA	6.2%	0.5%	1.9%
Average	3.8%	1.9%	3.0%

Table 4. Percentage of APAIS for-hire trips for each state which exactly matched VTR trips in months of sampling for the APAIS by year. 2019-2020 are full years while 2021 is only through September.

State	2019	2020	2021
ME	28.8%	7.4%	16.0%
NH	48.0%	46.5%	28.6%
MA	21.1%	23.0%	12.1%
RI	55.8%	60.6%	50.8%
CT	40.8%	21.1%	12.2%
NY	45.7%	41.2%	39.1%
NJ	45.8%	18.9%	30.4%
DE	42.2%	21.4%	15.7%
MD	8.2%	2.0%	2.5%
VA	40.0%	14.7%	12.3%
Average	37.6%	25.7%	22.0%

Table 5. Percentage of VTR trips for each state which exactly matched APAIS for-hire trips in months of sampling for the APAIS by year. 2019-2020 are full years while 2021 is only up through September.

Table 4 shows that the coastal average matching rate for a typical year (i.e., 2019 and 2021) was ~2% higher than the target matching percentage of 1% in the Dukes et al. (2017). Not only is the coastal average higher, but each state exceeds the minimum benchmark of 1% matching rate proposed by Dukes et al. (2017). Thus, each state's list of federal vessels could have adequate validation of logbook data. For the same timeframe, Table 5 shows that the matching rate of VTRs to APAIS trips was ~28% but this is not representative of a 'true' percentage as some of the vessels from APAIS trips do not have GARFO permits (and thus do not report via federal VTR). Figure 1 helps to illustrate how closely the matching of APAIS and logbook data can be, even at lower matching percentages.

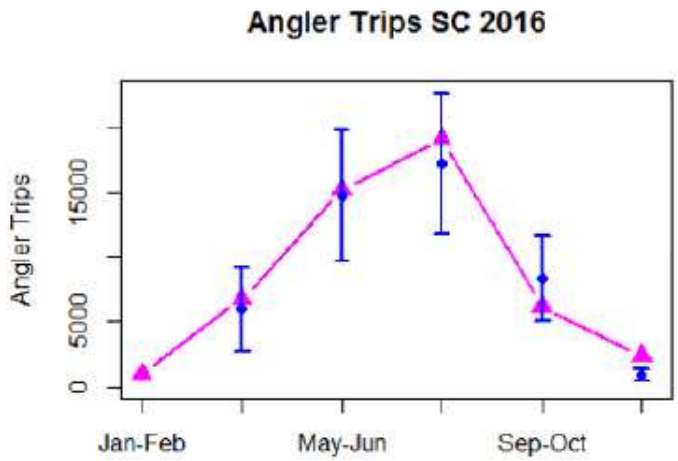


Figure 1. Example from Dukes et al. (2017) using estimated angler trips by Wave (blue dots) from the APAIS with 95% confidence intervals (blue verticals) compared to logbook reports (magenta triangles).

Since the analysis above did not take months outside of APAIS sampling into consideration (Table 6), it is worth noting that conducting APAIS in for-hire mode year round to use as validation for VTRs reported by state, is worth further consideration.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
ME					X	X	X	X	X	X		
NH					X	X	X	X	X	X		
MA				X	X	X	X	X	X	X	X	
RI				X	X	X	X	X	X	X	X	
CT			X	X	X	X	X	X	X	X	X	X
NY			X	X	X	X	X	X	X	X	X	X
NJ			X	X	X	X	X	X	X	X	X	X
DE			X	X	X	X	X	X	X	X	X	X
MD			X	X	X	X	X	X	X	X	X	X
VA			X	X	X	X	X	X	X	X	X	X
NC	X	X	X	X	X	X	X	X	X	X	X	X
SC			X	X	X	X	X	X	X	X	X	X
GA			X	X	X	X	X	X	X	X	X	X

Table 6. Months of APAIS coverage on the Atlantic Coast.

Effort and Catch Estimation

Using matched trips, estimates can be developed to combine logbook and survey data that account for underreporting (trips that occurred but were not reported), misreporting (trip specifics which are not correctly reported), or both simultaneously. Based on the findings of Dukes et al. (2017), a difference-based estimation (Breidt et al. 2017) is preferred to that of the capture-recapture methodology since it is less sensitive to small sample sizes and because it preserves additivity across domains (i.e., combined logbook estimates for all Waves sum to annual total). These combined estimates can be applied to both logbook and survey characteristics such as the angler/boat trips, overall catch, and harvested/discarded catch by species.

We propose the use of two distinct difference-based estimators (i.e., $T_{y,diff1}$ and $T_{y,diff2}$), used in Dukes et al. (2017) as estimation methods but with the understanding that only a single method will likely be used in the future. Further exploration of results amongst other states/years would help provide more real-world context but we recommend the use of mathematical equations used in an imperfect matching setting. For additional information and specifics, see Breidt et al. (2017).

The difference-based estimators are based on the survey-weighted intercept data, logbook data, and match metrics from a matching algorithm. Estimator calculations include standard error. In the difference-based estimation of catch specifically, the method is calculated as: logbook effort/catch, plus estimated unmatched effort/catch (on trips intercepted by dockside survey but with no logbook trip reported), plus the difference between logbook reported and survey observed effort/catch.

This analysis is reliant on the aforementioned match metrics. These metrics will be normalized as (1) high quality, (2) low-quality, and (3) non-match. This will inform the weighting of the effort and catch estimates from a trip – non-matches will be weighted as 0, low-quality matches will be weighted as 0.5, and high-quality matches will be weighted as 1. If a combination of high-quality, low-quality, and non-match values is observed for a given trip match, the weight normalized values between 1.0 and 0 will be attributed, based on that match value. Using an amended delineation from Dukes et al. (2017), we propose any normalized match metric value ≥ 0.5 to be considered a match and any value <0.5 to be not matched. Trips which are matched represent a sample of for-hire trips which are potentially reported but with uncertain matching. Therefore, non-matches represent a sample of trips that were likely not reported or misreported.

The same estimation process for effort will be used for catch: a combination of intercept records, logbook catch records, and match metrics from a matching algorithm will be used to develop difference based estimators. Kept and released records will be treated separately since released species are self-reported whereas kept records can be validated by the dockside interviewer. The combined estimators of the difference based estimation track logbook catch values closely if there is no MRIP-intercepted catch, and otherwise adjust catch upward to reflect unmatched (and presumably unreported) trips. The combined estimators tend to have standard errors no larger than the standard errors of MRIP-only estimators. When matching is good, MRIP and logbook catch values are consistent with one another, and the standard errors for the combined catch estimators can be much smaller than those of MRIP-only (Figure 2). Catch data is more difficult to match because logbooks record catch for the whole party while APAIS records have catch for each individual angler.

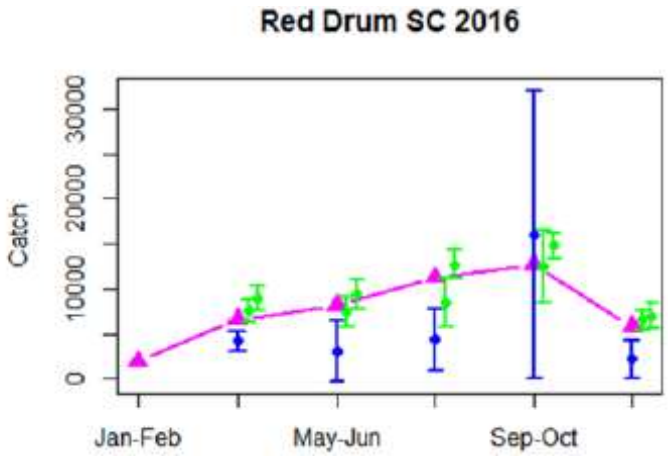
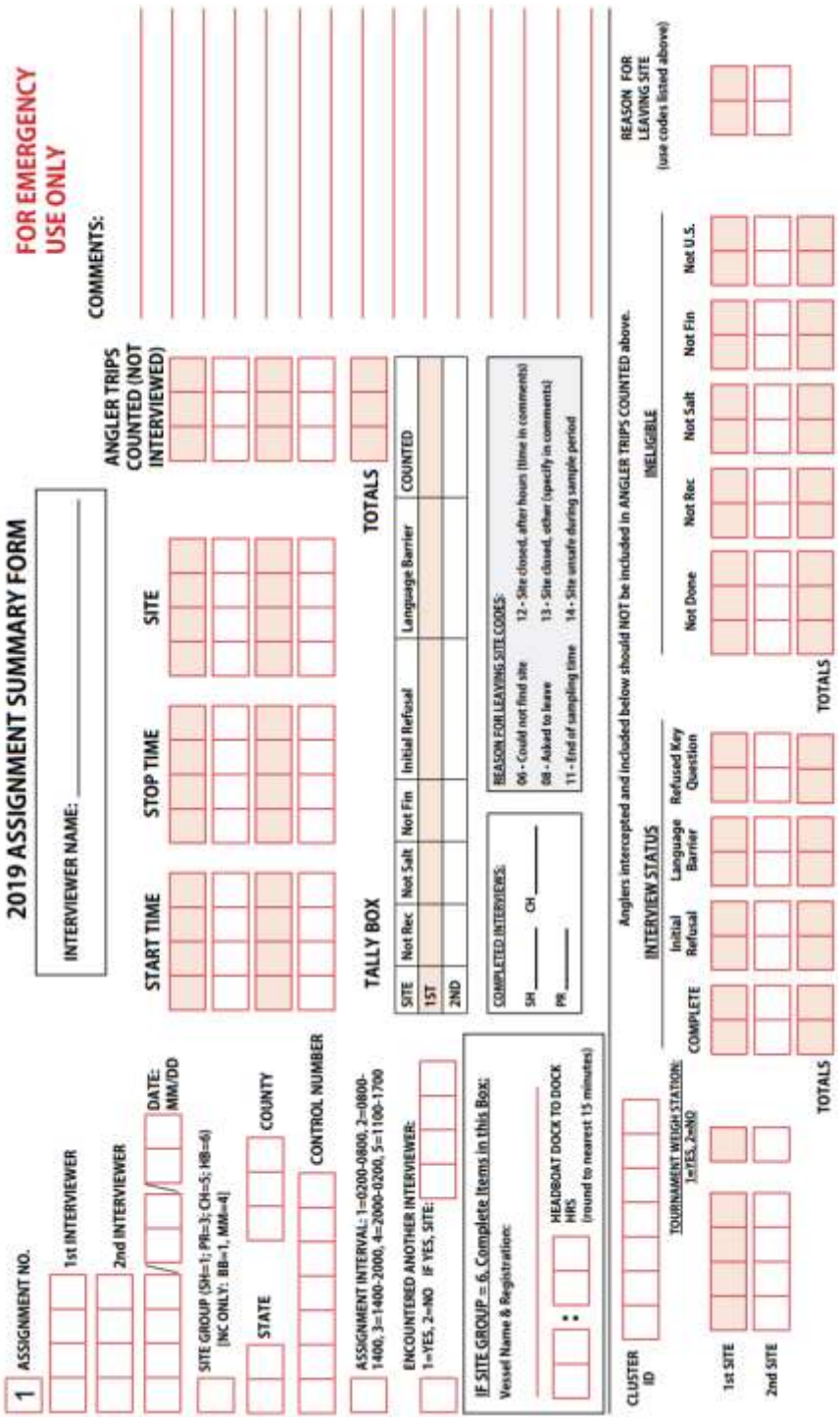


Figure 2. Estimated red drum catch by wave with approximate 95% confidence intervals, compared to logbook (magenta triangles). Estimators included are MRIP only (blue) and difference estimators $T_{y,diff1}$ and $T_{y,diff2}$ (green).

Appendix A: APAIS Questionnaire



1. FORM

FOR EMERGENCY USE ONLY

2. ASSIGNMENT NO. 1

3. INTERVIEWER ID

4. DATE: MM/DD

5. INTERCEPT NO.

6. INTERVIEW TIME *(use 2400 clock)* *Time this interview was completed*

7. STATE CODE

8. COUNTY CODE

9. SITE CODE

10. INTERVIEW STATUS (Key Item = *)

1 Questionnaire Complete
2 Refused Non-Key Item
5 Refused Key Item

READ PRIVACY ACT: This study is being conducted in accordance with the privacy act of 1974. You are not required to answer any question that you consider to be an invasion of your privacy.

***11. Would you say you were fishing from ...**

SHORE
0 Pier
1 Dock
2 Jetty, Breakwater
3 Bridge, Causeway
4 Other Man-made Structure *(Specify)* _____
5 Beach or Bank *(Additional hours required in Q16)*

BOAT
6 Headboat
7 Charterboat
8 Private Boat
9 Rental Boat

12. Was most of your *(specify mode)* fishing effort today in the ... *(Select only one)

1 Ocean/gulf

2 Sound *(Other than listed)*
3 River *(Other than listed)*
4 Bay *(Other than listed)*
5 Other *(Specify)* _____

V Cape Cod Bay
A Narragansett Estuary
B Buzzard's Bay Estuary
C Long Island Estuary
D Hudson/Raritan Estuary
E Delaware Estuary
F Chesapeake Estuary
G Albemarle/Pamlico Estuary

***13. Was that ...**

1 Three Miles or Less From Shore
2 More Than Three Miles

8 Waterbody Does Not Apply

13a. Were you fishing an artificial reef today?

Yes — If yes, enter Reef Code *If "Don't Know" = 998 If "Refused" = 999*
No

Name: _____

14. What type of gear was primarily used? *(Select one only)*

01 Hook and Line
02 Dip Net, A-frame
03 Cast Net
04 Gill Net
05 Seine
06 Trawl
07 Trap
08 Spear
09 Hand
10 Other *(Specify)* _____
98 Unknown
99 Refused

15a. To the nearest half-hour, how many hours have you spent *(specify mode)* fishing today? That is, how many hours have you actually spent with your gear in the water?

No. of Hours *If "Don't Know" = 99.8 If "Refused" = 99.9*

15b. [If on boat] To the nearest half-hour, how many hours have you spent on the boat, away from the dock, today?

No. of Hours *If "Don't Know" = 99.8 If "Refused" = 99.9*

Not Applicable – SH mode

16. [Ask, only if "Beach" or "Bank"] How many additional hours do you expect to fish from shore today? That is, how many more hours will you actually have your gear in the water?

No. of Hours *If "Don't Know" = 99.8 If "Refused" = 99.9*

Not fishing from Beach or Bank

17. What species were you primarily fishing for today?

No Particular Species/Anything

1st Target _____

2nd Target _____

18. Not counting today, within the past 12 months, that is since *(insert month)* of last year, how many days have you gone saltwater sport finfishing in this state or from a boat launched in this state?

No. of days
998 Don't Know
999 Refused

19. Not counting today, within the past 2 months, how many days?

No. of days
98 Don't Know
99 Refused

***20. What is your state and county of residence? *If county unknown, ask:* What city or town do you live in?**

State Code; Name: _____ *If foreign country code = 97*

County Code; Name: _____ *If foreign country code = 997*

21. What is the ZIP code of your residence?

99997 Foreign Country
99998 Don't Know
99999 Refused

23a. Gender *(observed, do not ask)*

Male
Female

23b. How old were you on your last birthday?

Age

Refused

24. In the event that my supervisor wishes to verify that I have been conducting interviews here today, may I please have your name and phone number?

Angler Name

Phone ___ - ___ - ____ Day ☐ or Night ☐

If name and/or phone number not given, Q10 = Status 2)
☐ Name and/or phone number not given
☐ Angler aged 16 years or younger (Check both boxes)

BOX B. [If headboat ride-along:] Is this one of the anglers you monitored for discard (Type 9) catch? ☐ Yes ☐ No ☐ Not a HB ride

*25. UNAVAILABLE CATCH Did you catch any fish that are not here for me to look at? For example, any that you may have thrown back or used for bait? NOT GROUP CATCH - Only catch from Angler being interviewed.

Disposition Codes for Q25

1 - Thrown back alive
2 - Thrown back - not legal
3 - Eaten/plan to eat
4 - Used/plan to use for bait
5 - Sold/plan to sell
6 - Thrown back dead/plan to throw away
7 - Some other purpose

TYPE 2 RECORDS: *(CATCH UNAVAILABLE IN WHOLE FORM; FILLETS ARE UNAVAILABLE CATCH.)*

	Species Name	Species Code	# of Fish	Disp.
1.				
2.				
3.				
4.				
5.				

*26. Did you catch any fish while you were fishing that I might be able to look at?
1 ☐ Yes
2 ☐ No - *Code Q27, Q28, Q29 as "Not Applicable"*
3 ☐ Yes, BUT fish on another angler's form – *Record interview # where fish are listed* ☐☐ *Code Q27, Q28, Q29 as "Not Applicable"*

*27. Did you catch these yourself or did someone else catch some of them?
1 ☐ All Caught by Angler - *Code Q28, Q29 as "Not Applicable"*
2 ☐ Other Contributors 8 ☐ Not Applicable

*28. Can you separate out your individual catch?
1 ☐ Yes – *Code 29 as "Not Applicable"*
2 ☐ No 8 ☐ Not Applicable

*29. How many anglers including yourself have their catch here? Please do not include anyone who did not catch fish. Only count those who have their catch here.
☐☐ No. of Contributors 88 ☐ Not Applicable

BOX C. *If Q11 is SH mode, code Q30 as "888," and Code Box D as "8."*

*30. How many people fished on your boat today?
☐☐☐ No. of People 888 ☐ Shore Mode

*BOX D. *If response to Q30 is 001, code as "Not Applicable." Otherwise, is this the first angler from this boat that I have interviewed?*
1 ☐ Yes 8 ☐ Not Applicable
2 ☐☐ No – *Record interview # of 1st angler in the fishing party.*

*BOX E: *Is this charter/headboat on the Good List?* ☐ Yes ☐ No Vessel name or registration: _____
☐ Check box if vessel has no name AND no registration number. If checked, Q10 (Status) = 5.

*31. AVAILABLE CATCH – ASK: May I look at your fish? What do you plan to do with the MAJORITY of the (species)?

Disposition Codes for Q31

3 - Eaten/plan to eat
4 - Used/plan to use for bait
5 - Sold/plan to sell
6 - Plan to throw away
7 - Some other purpose

NOTES/COMMENTS:

TYPE 3 RECORDS: *(INDIVIDUAL CATCH AVAILABLE IN WHOLE FORM)*

	Species Name	Species Code	# of Fish	Length (mm)	Weight (kg)	Disp.
1.					.	
2.					.	
3.					.	
4.					.	
5.					.	
6.					.	
7.					.	
8.					.	
9.					.	
10.					.	
11.					.	
12.					.	
13.					.	
14.					.	
15.					.	

Appendix B: SC For-Hire Logbook Validation Metrics

Fields used to compare APAIS interviews grouped by party and SC DNR charter logbook trip reports. Weights of the comparisons are based on importance and reliability.

Field	MRIP Definition	Logbook Definition	Match Metric Weight
Date	Date of interview	Date of reported trip	1.00
Start Site	Interview site	Site reported as the start site	0.30
Anglers	Number of individuals in the party	Number of anglers reported participating	0.30
Target Species	Species of fish being targeted	Species of fish being targeted	0.20
Hours Fished	Mean total hours fished of interviewees	Total hours fished as reported	0.10
Distance	Categorized distance from shore fished	Categorized distance from shore fished	0.10
Trip End Time	Mean interview time	Estimated trip end time	0.01

Atlantic States Marine Fisheries Commission

Coastal Pelagics Management Board

May 2, 2022
1:00 – 2:00 p.m.
Hybrid Meeting

Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary.

1.	Welcome/Call to Order *(J. Cimino)*	1:00 p.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings from October 2020	1:00 p.m.
3.	Public Comment	1:05 p.m.
4.	Consider Quota Block Timeframe for Cobia **Possible Final Action** • Technical Committee Report *(A. Giuliano)* • Consider Changes to the Three-Year Quota Block for Harvest Specifications for Cobia *(J. Cimino)*	1:15 p.m.
5.	Updates on Spanish Mackerel Stock Assessment Timeline and Federal Waters Management *(E. Franke)*	1:45 p.m.
6.	Elect Vice-Chair *(J. Cimino)* **Action**	1:55 p.m.
7.	Other Business/Adjourn	2:00 p.m.

The meeting will be held at The Westin Crystal City (1800 Richmond Highway, Arlington, VA; 703.486.1111) and via webinar; click here for details

MEETING OVERVIEW

Coastal Pelagics Management Board
May 2, 2022
1:00 – 2:00 p.m.
Hybrid

Chair: Joe Cimino (NJ) Assumed Chairmanship: 11/21	Technical Committee Chair: Cobia: Angela Giuliano (MD)	Law Enforcement Committee Rep: Capt. Chris Hodge (GA)
Vice Chair: Vacant	Advisory Panel Chair: Craig Freeman (VA)	Previous Board Meeting: October 20, 2020
Voting Members: RI, NY, NJ, DE, MD, PRFC, VA, NC, SC, GA, FL, SAFMC, NMFS (13 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from October 2020

3. Public Comment – At the beginning of the meeting, public comment will be taken on items not on the agenda. Individuals that wish to speak at this time must sign-in at the beginning of the meeting. For agenda items that have already gone out for public hearing and/or have had a public comment period that has closed, the Board Chair may determine that additional public comment will not provide additional information. In this circumstance, the Chair will not allow additional public comment on an issue. For agenda items that the public has not had a chance to provide input, the Board Chair may allow limited opportunity for comment. The Board Chair has the discretion to limit the number of speakers and/or the length of each comment.

4. Quota Block Timeframe for Cobia (1:15-1:45 p.m.) Possible Final Action

Background

- In February 2020, the Board (formerly part of the South Atlantic Board) set the total cobia harvest quota for 2020-2022. In 2021, the allocation of that total quota changed through Addendum I, and some states implemented new recreational cobia measures in 2021.
- Since the 2021 changes in quota allocation and regulations occurred in the middle of the current 2020-2022 quota block, the Cobia Technical Committee met in March 2022 to discuss whether to shift the quota block to align with those management changes **(Briefing Materials)**.
- If the current 2020-2022 quota block is maintained, then the Board would consider new specifications for the 2023 fishing season. If the quota block is shifted to 2021-2023, then the current total quota would apply to the 2023 fishing season; the Board would then consider setting new specifications for the 2024 fishing season.

Presentations

- Technical Committee Report by A. Giuliano

Board actions for consideration at this meeting

- Consider changes to the three-year quota block for harvest specifications for cobia

5. Updates on Spanish Mackerel Stock Assessment Timeline and Federal Waters Management (1:45-1:55 p.m.)

Background

- The SEDAR 78 report for Spanish Mackerel (operational assessment) will be submitted to the South Atlantic Fishery Management Council (SAFMC) by no later than May 13, 2022.
- The SAFMC's Scientific and Statistical Committee will review the SEDAR 78 results and provide recommendations in Summer 2022, which will then be discussed by the SAFMC at their September 2022 Council meeting.
- For Spanish mackerel management measures in federal waters, Amendment 34 to the Coastal Migratory Pelagics Fishery Management Plan was recently approved by the SAFMC in March 2022 and by the Gulf of Mexico Fishery Management Council in April 2022. Council staff are currently working on finalizing the amendment to be transmitted to NMFS for rulemaking.
- Amendment 34 would allow cut-off (damaged) Atlantic Spanish mackerel caught under the recreational bag limit, which comply with the minimum size limits, to be possessed, and offloaded ashore. For the purposes of this Amendment, damaged refers to Spanish mackerel that are damaged only through natural predation.

Presentations

- Updates on the assessment timeline and federal waters management by E. Franke

6. Elect Vice Chair (1:55-2:00 p.m.) Action

Background

- The vice chair seat is empty since the Coastal Pelagics Board was formed (formerly part of the South Atlantic/Federal Fisheries Board).

Board actions for consideration at this meeting

- Elect Vice Chair

7. Other Business/Adjourn (2:00 p.m.)

Coastal Pelagics Board

Activity level: Moderate

Committee Overlap Score: Moderate

Committee Task List

- Cobia TC – Develop specification recommendations for the next quota block
- Cobia TC/PRT – July 1: Compliance Reports Due
- Spanish Mackerel PRT – October 1: Compliance Reports Due

Technical Committee Members:

Cobia TC: Angela Giuliano (MD, Chair), Nichole Ares (RI), Brian Neilan (NJ), Somers Smott (VA), Anne Markwith (NC), Justin Yost (SC), Chris Kalinowsky (GA), Christina Wiegand (SAFMC), Michael Larkin (SERO), Emilie Franke (ASMFC)

Plan Review Team Members:

Cobia PRT: Angela Giuliano (MD, Chair), Somers Smott (VA), Chris McDonough (SC), Emilie Franke (ASMFC)

Spanish Mackerel PRT: McLean Seward (NC), BJ Hilton (GA), Chris Swanson (FL), Christina Wiegand (SAFMC), John Hadley (SAFMC), Emilie Franke (ASMFC)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

SOUTH ATLANTIC STATE/FEDERAL FISHERIES MANAGEMENT BOARD

Webinar
October 20, 2020

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INDEX OF MOTIONS

ATTENDANCE

Board Members

Joe Cimino, NJ (AA)
Adam Nowalsky, NJ, proxy for Sen. Andrzejczak (LA)
John Clark, DE, proxy for D. Saveikis (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Lynn Fegley, MD, Administrative proxy (Chair)
Russell Dize, MD (GA)
Phil Langley, MD, proxy for Del. Stein (LA)
Pat Geer, VA, proxy for S. Bowman (AA)
Chris Batsavage, NC, proxy for S. Murphey (AA)
Bill Gorham, NC, proxy for Rep. Steinburg (LA)
Jerry Mannen, NC (GA)
Mel Bell, SC, proxy for P. Maier (AA)
Malcolm Rhodes, SC (GA)
Doug Haymans, GA (AA)
Spud Woodward, GA (GA)
Jim Estes, FL, proxy for J. McCawley (AA)
Rep. Thad Altman, FL (LA)
Marty Gary, PRFC
John Carmichael, SAFMC
Roy Crabtree, NMFS
Mike Millard, USFWS

(AA = Administrative Appointee; GA = Governor Appointee; LA = Legislative Appointee)

Ex-Officio Members

Joey Ballenger, Red Drum SAS Chair
Harry Rickabaugh, Black Drum and Spot TC Chair
Dawn Franco, Atl. Croaker TC Chair
Angela Giuliano, Atl. Cobia TC Committee Chair
Chris Hodge, Law Enforcement Committee Rep

Staff

Robert Beal
Toni Kerns
Maya Drzewicki
Max Appelman
Kristen Anstead
Chris Jacobs
Jeff Kipp
Laura Leach
Savannah Lewis
Sarah Murray
Mike Rinaldi
Caitlin Starks
Deke Tompkins
Geoff White

Guests

Bill Anderson, MD (AA)
Pat Augustine, Coram, NY
Michael Auriemma, NJ DEP
Russ Babb, NJ DEP
Wes Blow
Deidre Boelke, NEFMC
Ellen Bolen, VMRC
Jason Boucher, DE DFW
Rob Bourdon, MD DNR
Dick Brame, CCA
Jeff Brust, NJ DEP
Kristin Butler, US Senate Fellow
John Carmichael, SAFMC
Matt Cieri, ME DMR
Heather Corbett, NJ DEP
Derek Cox, FL FWC
Jessica Daher, NJ DEP
Pamela D'Angelo
Lorena de la Garza, NC DENR
Rick DeVictor, NOAA
Lewis Gillingham, VMRC
Bob Groskin, Teaneck, NJ
Asm. Eric Houghtaling, NJ (LA)
Adam Kenyon, VMRC
Wilson Laney
Greg Ludlum
Mike Luisi, MD DNR
Shanna Madsen, VMRC

Guests (continued)

Casey Marker
Ann Markwith, NC DENR
Chris McDonough, SC DNR
Jack McGovern, NOAA
Jason McNamee, RI (AA)
Chris Moore, CBF
Allison Murphy, NOAA
Ken Neill
Travis O'Neal
Gerry O'Neill, Cape Seafoods
Derek Orner, NOAA
Paris Morgan, VMRC
Olivia Phillips, VMRC
Paul Piavis, MD DNR
Nick Popoff, FL FLW
Brandon Raguz, NOAA
Jill Ramsey, VMRC
Ray Rhodes, Charleston College
Tara Scott, NOAA
McLean Seward, NC DENR
Somers Smott, VMRC
Helen Takade-heumacher, FL FWS
Beth Versak, MD DNR
Mike Waine, ASA
Kate Wilke, TNC
Angel Willey, MD DNR
Chris Wright, NOAA
Justin Yost
Daniel Zapf, NC DENR
Erik Zlokovitz, MD DNR

The South Atlantic State/Federal Fisheries Management Board of the Atlantic States Marine Fisheries Commission convened via webinar; Tuesday, October 20, 2020, and was called to order at 1:15 p.m. by Chair Lynn Fegley.

CALL TO ORDER

CHAIR LYNN FEGLEY: Good afternoon everyone! Welcome to the South Atlantic Board. I'm Lynn Fegley; representing the state of Maryland, and currently serving as your Chair. The sun has come out, it is turning into a beautiful afternoon in our little section of the Mid-Atlantic. I hope the same for all of you, and I really do look forward to the day when we can do this again in person.

APPROVAL OF AGENDA

CHAIR FEGLEY: We have a big agenda today, and the staff have been really nice to provide an agenda in our materials that has time associated with it. I'm going to try really hard to stick with those, and the marquis event is of course the finalization of Addendum I to Amendment 1 for Atlantic cobia. With that I'll dig in, and the first order of business is to approve the agenda. Is there anyone who has any changes or modifications to the agenda?

MS. TONI KERNS: I see no hands.

CHAIR FEGLEY: Okay, seeing none, I'll move on to the approval of the proceedings, which are in your package.

APPROVAL OF PROCEEDINGS

CHAIR FEGLEY: They are the proceedings from our August 2020 meeting. Does anyone have any changes or modifications proposed for those proceedings?

MS. KERNS: I don't see any hands.

PUBLIC COMMENT

CHAIR FEGLEY: Perfect, okay seeing none, the next piece on our agenda is public comment. Toni, do we have anybody signed up to speak?

MS. KERNS: There is no sign up this week. We'll just ask to see if anybody wants to comment on anything that is not on the agenda.

CHAIR FEGLEY: Yes, okay, so I will ask that question. If there is anybody who wants to comment. I just will remind everyone, I know we're finalizing an Addendum today, and we've had hearings on those addenda, so that was the opportunity for comment. Those who have something to share with the Board that is not on the agenda, please raise your hand.

MS. KERNS: Lynn, you have Dewey Hemilright.

CHAIR FEGLEY: Okay Dewey, go ahead, please.

MR. DEWEY HEMILRIGHT: Thank you, Lynn, and also thank you for the opportunity to comment. With the cobia is a bycatch fishery, and it would be good if we could turn regulatory discards into landings. As the abundance of this fish is increasing, I would think that one thing that needs to be done is to look at when you're landing the cobia fish.

Right now, there is only in pounds, there is no way, or it is my belief that states do not record how many fish are landing. Given that you have a landing limit that is put into number of fish, it would be good if we could also see, probably for future stock assessments that each state that have commercial landings of cobia be put in the amount of fish that is landed. That is kind of my comments, sticking to the parameters of allowed comments, and thank you.

CHAIR FEGLEY: Thank you, Mr. Hemilright, I appreciate that. Is there anybody else with public comment?

MS. KERNS: I don't see any other hands raised, Lynn.

ATLANTIC COBIA ADDENDUM I TO AMENDMENT 1 FOR FINAL APPROVAL

CHAIR FEGLEY: Okay, so with that the next agenda item is to get right into Addendum I, and with that Toni, I'll kick it over to you to take us through it.

MS. KERNS: The Board took Addendum I out for public comment, and we had four hearings. Some of those were joint hearings amongst the states. These hearings were all held via webinars. We had about 25 folks that were in attendance at the different hearings. (Loud noise). I apologize, as if it were landing on my house.

We had nine comments come in as letters, seven of those were individuals, the majority of those being commercial fishermen, and two were from groups, ASA and VFFA, and both of those groups are recreational fishermen. We'll get directly into the issues in that top slide, Maya. This Addendum is looking at several factors for cobia management.

REVIEW OPTIONS AND PUBLIC COMMENT

MS. KERNS: The first issue is looking at allocation, and the decision of how to split the allocation of the quota between the commercial and the recreational fishery. There were four options that went out for comment that varied from status quo, which is 92 percent recreational, 8 percent commercial. The second option was 97-3, the third option is a 96-4 percent split, and the last option being the 95-5 percent split.

Option B is the option that if you were to have fit the new MRIP data into the quota allocation, is roughly what the allocation lines up to be between the commercial and recreational fishery, and then Option C and D are options that fall within the range of landings that have occurred over the last year. This table indicates the support that we received, either through the hearing, or through their written comments.

The majority of the comments that we received were for status quo, and then there was some additional support for the 97-3 percent, and one support for the 96-4 percent. In particular in the hearings and in some of the written comments, we had individuals that spoke strongly in favor of status quo, because the commercial fishery had been closed several times in the past few years, and that they hadn't had the opportunity to try and harvest the total 8 percent of the quota at an increased quota. They indicated that de minimis landings would only be increasing, as we see cobia expand its range.

Since the de minimis states are included in the overall quota, the new quota should be able to accommodate this growing fishery. Commenters indicated that the cobia fishery is mainly a bycatch fishery, it should be opened year-round, due to consumer demand, the high price per pound, and the year-round participation.

In addition, people felt that revisiting a change in allocation in a few years, once the commercial fisheries have a chance to try and catch their full quota, may be something that could be looked at. One participant brought up that when quota gets taken away from the commercial industry that the consumer also loses, that cobia is considered a public trust resource.

To cut the resource and deprive the public, that those who may not be able to afford to go out and catch their own cobia, well it shouldn't happen. Those commenters that were in favor of the status quo wanted to see the fishery, if not status quo, then Option C, 97-3, to allow the recreational fishery to be able to catch their full harvest, that this is what the data is showing the split should be under the allocation method with the updated data.

In the discussions that we had during some of the public hearings, there were questions from the public about discard data. You know that the commercial fishery isn't always able to fully harvest, because they have to discard their catch. We do have very limited discard information out there in the commercial fishery.

Virginia does have some observer data, and so this data here is the information that they have, it goes back to 2016. There are a limited number of trips, as you can see, and all of the discards in these trips were because the fish was under its size limit. The next issue is the commercial trigger. As you recall, we had previously established a commercial trigger method, and this trigger tells us when we need to close the commercial fishery, when we're starting to get close to the quota.

It was a formula that was developed, and when we got the new limits from the updated stock assessment, the quota was really high. When we tried to apply the trigger formula to a really high quota, the TC found that it didn't work. They also actually found that if the quota had been really low the trigger method wouldn't work in that case as well, so they developed a new method, and are recommending that the Board move to this new method, so that we are able to close the fishery when we're getting close to the quota.

This, just to remind everybody, is that because some of the states need a little bit of additional time to close their fishery, you can't just close immediately 48 hours after you hit a trigger. It's the reason why we are looking for a longer period of time of advanced notice than in normal fisheries. It's giving you a 30-day warning to give the states that need a longer administrative timeframe to actually get their process through, and then close the fishery. There were a few folks that were in favor of status quo, not changing the trigger. There were about four folks that were in favor of making change to the trigger. There is not a lot of rationale behind folks who support that. The next issue is looking at commercial de minimis measures, and there are six options here to look at changes in the commercial de minimis measures. This is looking at how much of this commercial quota should be set aside for the de minimis states.

All of the states are currently de minimis on the Board, except for South Carolina, Virginia, and North Carolina. The first option is status quo, it is to set aside 3 percent of the quota. Option B is to set aside 3 percent, but limit it to 3,000 pounds. The third option is setting aside at 3 percent and limiting to 5,000 pounds.

Next slide is Option B, the fourth option is setting aside 4 percent of the quota. Option E is setting aside 4 percent but capping it at 3,000 pounds, and Option F is setting aside 4 percent of the quota and capping it at 5,000 pounds. This is just a reminder to the Board, and under the different quota scenario options, how much the quota would actually be set-aside for each of the quota options here.

See those values of what they are associated with. Under the 3 percent option, the most that can be set-aside is just over 4,000 pounds, and the smallest amount is just over 1,500 pounds. Then there is a 4 percent scenario, the highest would be almost 6,000 pounds, and the lowest is just about 2.200 pounds.

The public comment here was quite mixed. There was very limited comment that we received. The only thing in terms of the verbal comments that we've received on this is that the fishery was expanding among states, and that there should be room to allow for these states to grow into a fishery.

We see that there was support for Option B, C, E, and F. Just as a reminder, as we have seen the expansion of this fishery, and we have started to see a lot of variability in the landings of the de minimis states. One year we'll have high landings, and the next year we'll have lower landings. It's quite all over the place. There is not a lot of pattern to what those days landings are over time.

The last issue is the recreational de minimis measures, and these have to do with the minimum sizes associated with the de minimis measures. This issue came about from information coming out of the last stock assessment, SEDAR 58, looking at what size are fish actually mature. The Option A is status quo, it's a 29 fork-length, or 33 inches.

Option B is 31 inches fork-length, and 35 inches total length, and it's estimated that roughly 50 percent of the female would be mature at that size limit, and the status quo is roughly 33 percent of the female are mature at 29 inches. Then lastly for Option C, it's a 33-inch fork-length, total length 37 inches, and roughly 100 percent of the female would be mature at that size limit, and this also matches the commercial de minimis as well.

In terms of the comments that we received for this, all of the comments that we did receive were in support of the Option B, 100 percent female mature at this size limit, and folks felt like this was allowed for these fish to spawn at least once, to be able to produce young to add to the spawning stock biomass at least one time. It's important for the growth and health of the fishery. An additional comment that we did receive that isn't directly related to any of the options, but somewhat related to size limit, is that there is a growing concern amongst recreational anglers about spawning stock of cobia, and they wonder if the measures to allow for better protection of larger fish and more harvest of smaller fish would be an appropriate measure, and maybe looking at a slot.

Perhaps over the years recreational anglers have seen a decline in the bigger fish, and they don't want to see an overall decline in the stock. They just didn't know if that was because the size limits have increased, and increased over time. Madam Chair that is all of the information that I have in terms the summary of the public comment that we received. Once we're done going through the Addendum, I do want to come back and discuss the next step that we need to take, in terms of setting measures for next year.

CHAIR FEGLEY: Okay, great and thank you. I just want to take a quick moment for anyone who is listening from the public who attended and participated in the public hearings. The turnout was a little bit low, and we really appreciate those who participate and weigh in, and public comment is very important to the deliberations of the Board. Thank you, and keep it up, we appreciate it. With that, are there any questions for Toni on the presentation?

MS. KERNS: I don't see any hands raised, Lynn.

CONSIDER FINAL APPROVAL OF ADDENDUM I TO AMENDMENT 1

CHAIR FEGLEY: Okay, well with that then let's go to, maybe Maya what we can do is go to the slide that outlines Issue Number 1. Yes, Issue Number 1 so we can see it, and then we'll have at it. Is there anybody who wants to start off with discussion on Issue Number 1, Allocation?

MS. KERNS: Okay, we have Mel Bell.

CHAIR FEGLEY: All right, go ahead, Mel.

MR. MEL BELL: Yes, just something to point out that Option A, status quo. The status quo component of that, of the percentages, which we've inherited. But the way it works out, after the adjustment for MRIP, of course the landings or just the quota itself is not status quo. Option B is really probably closer to where the fishery was, related to the commercial component and the recreational piece.

I realize status quo, those are the percentages, and that's why we're calling that status quo. This is something of course we'll be dealing with, with all sorts of fish stocks over the next few years, as we get into allocation discussions for stuff that is worth pointing out.

CHAIR FEGLEY: Thank you, Mel. That is a very apt comment. Just for the edification of the Board, I believe that the commercial quota has been set for the last number of years at 50,000 pounds. That's a coastwide commercial quota. Anybody else with discussion on the issue, and then at some point we'll be looking for a motion.

MS. KERNS: You have Bill Gorham, and then Pat Geer.

CHAIR FEGLEY: Bill Gorham, go ahead.

MR. WILLIAM GORHAM: I just wanted to double check. At the 50,000-pound mark, then in fact wasn't there some overages that led to closures?

CHAIR FEGLEY: Yes, and Toni, if you want to provide more detail on that. But that is definitely true.

MS. KERNS: There were closures, I don't have all of that at my fingertips… (breaking up).

MS. TINA L. BERGER: Toni, you are difficult to hear right now.

MS. KERNS: Is that better, Tina?

MS. BERGER: Yes.

MS. KERNS: Prior to the relinquishing of the FMP to the Commission from the South Atlantic Council, the fishery did close several times under the 50,000-pound limit. Then that 50,000-pound limit carried over to the Commission's FMP. Last year we did not have to close the fishery though, and I need to double (stopped).

MS. BERGER: You also clipped out part of your last segment, Toni.

MS. KERNS: I said I need to double check what happened the previous year. Bill, is there another?

MR. GORHAM: I think Mel is referencing going back to 2000, 2008, when they came up with this split of 8 and 92, and kind of applying the new estimate surveys, applying that effort to that time series. To me, some of the recreational issues, or at least North Carolina. I just kind of feel like that would kind of be like rewriting history, as far as the participation in the fishery as compared to now. I'm just thinking to make that point, I'm just not sure if it's appropriate to apply, as far as North Carolina's fishery. Participation more recently is ten-fold more than that 2000 and 2008 period.

CHAIR FEGLEY: Thank you, Bill, and Pat Geer, I believe you were on deck.

MR. PAT GEER: I just want to agree with what Mel was saying. The status quo really, it's 146,000 pounds was the result of the MRIP calibrations and the new stock assessment. Nobody on the Board, when we met in February, thought that number was reasonable. They didn't think it was an appropriate number, and that is why this Addendum came about.

Really, I agree with Mel, status quo would be Option B. But if you look at the landings, the behavior of this fishery over the last five years. We are almost right in between B and C. The landings are right in between those two numbers. Those two options seem to me to be the most reasonable.

CHAIR FEGLEY: Thank you, Pat, appreciate that insight. Is there anybody else with comments on this issue, before we go to the motion?

MS. KERNS: Yes, Chris Batsavage, and Lynn, I apologize. We did close last year and the two previous years, so we have had to close the fishery '17, '18, and '19.

CHAIR FEGLEY: Thank you. Yes, that is really good information. Toni, were those closures, did those occur early in the year in September, or were they before that, do you know?

MS. KERNS: I need to look that up. Maybe Pat Geer, he might be able to respond faster than me.

MR. GEER: I believe they were about mid- August. They were about the same day each year, it was like October 23 or 24, right in that area, because it was literally right before our Commission meetings, so it was about mid-August when they closed.

CHAIR FEGLEY: Mid-August, great, thanks Pat. Chris Batsavage.

MR. CHRIS BATSAVAGE: I hate to be just throwing dates around exactly when we closed, and I would have to go back and check our proclamations, but it

seemed like it was early September that we got the notice from NOAA Fisheries that the 50,000-pound quota was reached, and we closed soon after in North Carolina. Other states closed a little later than that, you know just due to their administrative processes. But Toni is absolutely right, it was 2017, '18, and '19, and it was right about the same time each of those years.

CHAIR FEGLEY: Okay, anybody else on Issue 1?

MS. KERNS: We have Pat Geer and Marty Gary.

CHAIR FEGLEY: Okay, Pat Geer, go ahead.

MR. GEER: Yes, I'm sorry. I was just going to say that when the Feds were managing it, they announced it mid-August, and we closed it in Virginia on September 30, each of those years.

CHAIR FEGLEY: Okay, I think that is really helpful for the Board to know. Marty Gary.

MR. MARTIN GARY: No comments, but I would be willing to offer up a motion whenever you're ready.

CHAIR FEGLEY: I would say we're ready.

MR. GARY: Great or good, I'll go up and offer a motion related to Issue 1, recreational and commercial allocation. Move to approve Option C, 96 percent recreational and 4 percent commercial allocation. I would be happy to comment on that if I get a second.

MS. KERNS: You have Joe Cimino as the seconder.

CHAIR FEGLEY: Excellent, seconded by Joe Cimino. Marty, do you want to comment on your motion before we go to discussion?

MR. GARY: Sure, thank you, Madam Chair. PRFC is not a big-time player with this species, but as has already been mentioned multiple times, this fishery has been dynamic and changing and growing. As you'll hear probably a little bit later in the meeting, we've seen some fish move into our area.

In the three and a half decades I've been working on Chesapeake Bay, the last five years with this species has been very, very, different than the first three decades, where we hardly saw them. In the mid-Bay, our lower part of our jurisdiction comes to the confluence with Maryland and Virginia, so a very, very dynamic fishery.

But the rationale behind the motion for C, and Pat Geer I think really illustrated this pretty clearly. I think the sweet spot is somewhere there between B and C, but for what it's worth my thoughts are, if you look at the last five years the average coastwide commercial harvest is running about 64,000 and change. Given the fishery is growing, and the harvest in 2019, it looks like it was around 65,000 pounds.

My thought is maybe going for Option C. I'm a little bit concerned about going with B and that lower number. I'm just concerned that the way this fishery is trending that is going to put us in a bad position, you know with the commercial entities and some of this change that is going on. I really think, based on the way the trend is moving with the fishery, that is the better choice at this time. I'll yield after that.

CHAIR FEGLEY: Any more discussion on this motion?

MS. KERNS: We have Chris Batsavage, Doug Haymans, Joe Cimino, and Pat Geer.

CHAIR FEGLEY: Okay, Chris Batsavage, go ahead.

MR. BATSAVAGE: Yes, I think whatever allocation that ideally pick the one that provides enough fish for both the commercial and recreational fisheries, and that's not always an easy task. I think in terms of the commercial fishery, it's really important that whatever option we pick allows our fishery to remain open year-round, since landings are year-round, and you know largely incidental catch, while the fishery is targeting other species, especially in the fall.

These cobia catches are going to occur whether the season is open or closed, so it results in discards occurring. I looked at North Carolina commercial

landings in the fall from October to December in 2015 to 2016, those two years right before we had those early closures in September, and they ranked as 25 to 29,000 pounds. I think as stated earlier, 2019 landings were over 60,000 pounds, even with the early closure. This option might be that sweet spot, or maybe not. You know, especially as these fish expand north into other fisheries, where they may become incidental catch. With that, I would like to offer a substitute motion for Issue 1. The recreational and commercial allocation, move to approve Option D, 95 percent recreational and 4 percent commercial allocation.

CHAIR FEGLEY: Okay, is there a second to that?

MS. KERNS: Maya, that is Option D as in David, and then it is 95 recreational, 5 percent commercial. Then Doug Haymans, are you seconding it, or are you just wanting to speak?

MR. DOUG HAYMANS: I don't know, but no. I had an alternative substitute I wanted to offer, so I don't know how many substitutes allowed.

MS. KERNS: We can go two-deep, so you can do one more substitute if you would like.

MR. HAYMANS: Wait and see if Mr. Batsavage gets a second.

MS. KERNS: Pat Geer, are you seconding?

MR. GEER: No, I am not. I still just had my hand up.

CHAIR FEGLEY: Toni, after Chris we had Doug Haymans, Joe Cimino, and Pat Geer on deck. I think what I would like to do is find a second to Chris's motion, and then maybe work our way back around. I don't really want to miss what those three had to say. Maybe we'll get a second, and then start through the waiting list.

MS. KERNS: I currently do not see any hands for seconding this motion.

CHAIR FEGLEY: One more call, anyone care to second the motion by Mr. Batsavage for Option D as in dog.

MS. KERNS: I don't have any hands.

CHAIR FEGLEY: Okay, so in that case we will return to the main motion for Option C, and what I'm going to do is go back to the list, so Doug Haymans, you were on deck.

MR. HAYMANS: I really thought the reason we picked this Addendum to Amendment at all was for recalculating based on MRIP. For all the reasons that Pat and Mel both articulated earlier, Option B gets us closer to what the status quo was prior to the MRIP recalculations. I was truly hoping, based on all of our discussion back in February, that this Board was moving towards what is now Option B. **I would offer a substitute motion to approve Option B, please**.

CHAIR FEGLEY: Okay.

MS. KERNS: Okay Maya, before you get too far, I need you to bring that other motion that failed, **if you could just write motion failed for lack of a second, and then start your next substitute,** so we don't lose anything.

CHAIR FEGLEY: Thank you, Toni, that's good.

MS. KERNS: This is B as in boy, 97 percent recreational, and 3 percent commercial allocations. Mel Bell, are you seconding that?

MR. BELL: Yes, Ma'am.

MS. KERNS: Thank you, Mel, and that was by Doug Haymans, Maya, and the seconder is Mel Bell.

CHAIR FEGLEY: Okay, so now we have a new substitute motion on the table. I think what I would like to do is complete the list of people waiting to speak, or originally. Then once we do that, Doug, I think you offered good rationale for your motion. Let me go back. I had Joe Cimino next on the list to speak before the substitute motion. Joe, do you still want to address what's on the board?

MR. JOE CIMINO: Yes.

CHAIR FEGLEY: Go for it.

MR. CIMINO: I appreciate Doug's comments. I'm against the two substitutes, so far for the main. I'm representing the state of New Jersey, but spent a lot of time in Virginia when all of the major issues were going on with explosive MRIP estimates. You know if you drill down into those estimates, which we did in Virginia. We saw that they were talking about landing,

The MRIP estimates were saying that thousands of fish were landed, just in a weekend over the fourth of July weekend seemed to be a huge problem for these enormous MRIP estimates in Virginia. Those estimates are driving these percentages. At the time the recreational community said they were unbelievable.

That percentage, instead of going to the commercial fishery at 18,000 pounds to the commercial fishery, instead of 1,000 fish to the recreational fishery, is huge in addressing what Chris Batsavage and Dewey Hemilright have brought up that a lot of the fishery that exists commercially for this species is incidental. We're seeing it more and more further north, and I think it makes a hell of a lot of sense to allow those fish to actually be taken in the commercial fishery, than to play with the MRIP numbers here.

CHAIR FEGLEY: Thank you, Joe. Pat Geer, you were on deck. Do you still want to speak to what's on the board?

MR. GEER: Yes, I'll change what I was going to say. I appreciate the substitute motion by Doug, but I would question whether or not 54,000 pounds is the new status quo. As Marty mentioned, for the last five years they've caught about 65,000 pounds. That is what is being harvested, and I'll go back to say, the real number here is probably between Option B and Option C. But I think going with Option B may be problematic, because we're going to exceed that. We have been exceeding that. That could be a problem.

CHAIR FEGLEY: Thank you, Pat, yes, I think it is true that that issue of regulatory discards is one that we need to keep our eye on. Is there anybody else who now has comment to the substitute motion for Option B?

MS. KERNS: Lynn, you now have Roy Crabtree, Chris Batsavage, Mel Bell, and Spud Woodward.

CHAIR FEGLEY: Okay, Roy Crabtree.

DR. ROY CRABTREE: Yes, just to point out that the commercial landings were about 53,000 in 2018, and 68,000 in 2017. It's quite likely that under Option B that you would have closures. Also, it seems like the stock is healthy, and that the biomass of cobia has increased. It's not just the FES that are varied, there has been some increase. It doesn't seem unreasonable to me at least that commercial quota has increased a little. Thank you.

CHAIR FEGLEY: Thank you for that, Roy, I appreciate that insight on the stock assessment. Chris Batsavage.

MR. BATSAVAGE: I agree with the last few commenters, just as to that. You have the new MRIP estimates going into the stock assessments for a lot of species, and a changed understanding of who's catching what, and how much can be taken from the population with things being rescaled.

It has gone different directions, based on other factors going on with the stock because of new assessments. I think it might be taken from a different board meeting, but kind of thinking about the commercial increases that have occurred from these new updated assessments for other species, where the quota goes up for the commercial fishery by quite a bit, but the recreational fishery stays status quo.

I guess another way of looking at it is, you know the recreational fishery was already kind of harvesting where they were in the past. The commercial fishery was really held artificially low, you know due to our prior understanding of the stock with the quotas and

what not. I think that is exactly what we saw with cobia, you know with these early closures. Kind of a long-winded way of saying that I support the underlying motion.

CHAIR FEGLEY: Mel Bell.

MR. BELL: Yes, my attraction to Option B, which is obviously the most conservative approach, and I certainly don't deny that the commercial harvest for '17, '18, '19 exceeded that, and we did have to shut the fishery down. South Carolina unfortunately has some experience with cobia in our history. Just from our own experience, I guess I am very sensitive to the fact that we had a pretty good commercial fishery at one time in state waters, targeting these fish as they would move in to spawn. That went on for far too long, and effectively we pretty much wiped them out, in terms of our genetically identifiable distinct population segment. I guess I'm operating from a little bit of a sense of having seen bad things happen.

I don't deny the attractiveness of the fish for commercial use and all, but I'm just a little afraid of applying too much pressure to its supply, because if you allow the TAC, you know they will certainly harvest it. It's a very marketable product. Just based on our experience, and I know maybe we were a little bit different in how the fishery presented itself in confined inshore waters.

But I would argue that the Chesapeake Bay is certainly larger than a lot of our sounds. But if you put enough boats and enough effort in there, you know you could exert some pressure. I would favor Option B, just from a standpoint of being more conservative with the fishery. Again, from our experience, and I know our experience is rather unique.

We got to the point where we no longer have our commercial fishery is basically federal waters only at this point. That is my thinking was from a conservation standpoint of ensuring we have a fishery ten years from now, is maybe not over emphasizing the commercial side of it at this point.

CHAIR FEGLEY: Thank you, Mel. Spud, I believe you are on deck.

MR. A. G. "SPUD" WOODWARD: Yes, Mel covered a lot of what I was going to say. There recently was an assessment of the Gulf group cobia, and the results were not very encouraging. As the state is split up from the border to the east coast of Florida, we don't know what that is going to mean for the southern end of the Atlantic group cobia.

Plus, my biggest concern is that we are exceeding the existing commercial allocation routinely now, and not by a small percentage. If we set it at 73,000 pounds, is the expectation that we're actually going to end up catching 80-90,000 pounds of fish, and ultimately what will that mean for stock status, and ultimately what will it mean when we have to revisit these allocations, and make decisions about how to parse out this cobia stock?

CHAIR FEGLEY: I appreciate that insight. I guess based on that, I just wanted to add in for the Board's edification, and Toni can certainly correct me if I'm wrong. The commercial fishery is still held, it's pretty tightly regulated at a 2-fish per person possession limit, with a 6-fish per vessel cap.

States certainly would be able to ratchet that down independently, if they wanted to. Just for the public and the Board, I just wanted to make sure that everybody was aware that those provisions were still in place. With that, does anybody else have comment now on the substitute motion, Option B?

MS. KERNS: You have Bill Gorham.

CHAIR FEGLEY: Okay, Mr. Gorham, go ahead.

MR. GORHAM: To Mel's point, after Amendment 20-B and resulting ACL. That would force North Carolina, really everybody to take big measures in changing our fisheries, whether it's daily boat limits. We did a size limit in an effort of hoping to get another year of spawning to increase the biomass.

Then looking at the current allocations recreationally numbers wise, it started to look like we were going back into the same situation that is going to lead to more fish in the water. In a bycatch fishery, there is going to be more commercial catch. It's almost like one is going to lead to the other, and then we're restricting to restrict. We're going to end up with a lot of dead discard and wasted fish. I just thought I would point that out.

CHAIR FEGLEY: Thank you, Bill, appreciate that. Anybody else with comment to the substitute motion?

MS. KERNS: No other comments, Lynn.

CHAIR FEGLEY: Okay, would people like a moment to caucus before we call the question?

MS. KERNS: I see a hand up.

CHAIR FEGLEY: Okay, let's do this. By my clock it's 2:05. Let's try three minutes for caucus. We'll come back on line at 2:08, and we'll try to call the question back through to the main motion. Three minutes, folks. Okay, does anybody need more time to caucus?

MS. KERNS: I don't see any hands, Lynn.

CHAIR FEGLEY: **With that we're going to begin by calling the question on the substitute motion.** If it carries it becomes the main motion, if it fails, we go back to the main motion for Option C. Toni, are we going to follow the same proceedings, both groups raise their hand and you roll call?

MS. KERNS: Yes.

CHAIR FEGLEY: All in favor of the substitute motion, Option B, please raise your hand.

MS. KERNS: I have Florida, Georgia, and South Carolina. Take your hands down.

CHAIR FEGLEY: Okay, all opposed to the substitute motion, Option B, please raise your hand.

MS. KERNS: I have NOAA Fisheries, New Jersey, Delaware, Virginia, North Carolina, Maryland, and PRFC.

CHAIR FEGLEY: Okay, do we have any null votes? It doesn't look like it.

MS. KERNS: No null votes, Lynn.

CHAIR FEGLEY: And abstentions.

MS. KERNS: We have two abstentions. I'm sorry, The South Atlantic Fishery Management Council and U.S. Fish and Wildlife Service.

CHAIR FEGLEY: Okay, and you're going to count those votes up, Toni or Savannah?

MS. KERNS: I have 3 in favor, 7 against, 0 nulls and 2 abstentions.

MS. SAVANNAH LEWIS: That's what I have, Toni.

CHAIR FEGLEY: Okay, so the substitute motion failed, and now we return to the main motion, which is for the 96 percent recreational and 4 percent commercial allocation. Does anybody have a need now to caucus on this before we call the question? Raise your hand if you do.

MS. KERNS: No hands are raised.

CHAIR FEGLEY: All right, does anybody have some final words they want to throw at this before we call the question?

MS. KERNS: No hands were raised.

CHAIR FEGLEY: Okay, let's call the question. If you are in favor of this motion, please raise your hand.

MS. KERNS: I have NOAA Fisheries, South Carolina, New Jersey, Delaware, Virginia, North Carolina, Maryland, and PRFC. I'll take your hands down.

CHAIR FEGLEY: Okay, and all opposed.

MS. KERNS: I have Florida and Georgia. I will take your hands down.

CHAIR FEGLEY: Okay null votes.

MS. KERNS: No null votes.

CHAIR FEGLEY: And abstentions.

MS. KERNS: I have U.S. Fish and Wildlife Service and South Atlantic Council. I have 8 in favor, 2 against, 0 nulls, and 2 abstentions.

MS. LEWIS: That's what I have as well.

CHAIR FEGLEY: Terrific, thank you for the counting. **The motion carries, and I am going to read it into the record. It is for Issue 1 recreational and commercial allocation, move to approve Option C, 96 percent recreational and 4 percent commercial allocation.** It's a motion by Mr. Gary, second by Mr. Cimino, and I very much appreciate the discussion on that motion, lots of good all around, and something for us to consider going forward with this Board. With that I think we can move ourselves on to Issue 2, which is the commercial trigger. Are there any questions or commentary on this before we go to a motion?
MS. KERNS: No hands are raised.

CHAIR FEGLEY: Okay, does anybody care to throw out a motion for Issue 2?

MS. KERNS: Pat Geer.

CHAIR FEGLEY: Pat Geer, go for it.

MR. GEER: I'm sorry, you wouldn't let me unmute myself, and I apologize. I move to approve Option B of the new commercial trigger recommendation by the Technical Committee.

CHAIR FEGLEY: Thank you, Pat, did we have a second?

MS. KERNS: We have Mel Bell.

CHAIR FEGLEY: Thank you, Mel, so now we have a motion seconded, is there any discussion on this motion?

MS. KERNS: No hands are raised, Lynn.

CHAIR FEGLEY: All right, we're just going to roll through and call the question. Do you need to caucus on this one, please raise your hand?

MS. KERNS: There is no caucusing, and Lynn, since there was no discussion, you can maybe see if there is any opposition, then we don't have to do a counting.

CHAIR FEGLEY: Yes, you bet. Is there anybody opposed to this motion?

MS. KERNS: I do not see any hands raised.

CHAIR FEGLEY: **Fantastic, this motion is approved by consent, and it is to approve Option B, the new commercial trigger recommended by the Technical Committee.** Thank you for that. **Now, moving on to Issue 3, which is commercial de minimis.** We will start again. Is there anybody who would like to provide comment to Issue 3?

MS. KERNS: I don't see any hands raised.

CHAIR FEGLEY: In that case, is there anybody who would like to provide a motion for Issue 3, commercial de minimis?

MS. KERNS: Joe Cimino.

CHAIR FEGLEY: Okay, Joe, take it away.

MR. CIMINO: I would like to make a motion for Option F, which would be to allow 4 percent of the commercial quota, or a 5,000-pound cap, whichever is less be set aside and not accessible to non-de minimis states.

CHAIR FEGLEY: All right, thanks Joe, anybody with a second to this?

MS. KERNS: You have Mel Bell, and Maya, after 5,000 pounds, can you add the word cap, so add that language.

CHAIR FEGLEY: Great, thank you for that. Joe, since you're the maker of the motion, is there anything further you want to say about this before we go to discussion?

MR. CIMINO: Yes, thank you, Madam Chair. You know for me this is to address those concerns with having a closed fishery and discards for incidental takes, and then locations. I don't know that 5,000 pounds is the right number in perpetuity, but I think for right now it is a good start, and since we had some concerns on a growing commercial fishery, I think that this particular cap right now is appropriate.

CHAIR FEGLEY: I also just want to add. I know we had heard at the Board that there are some more northerly states also who are considering declaring an interest in cobia, and that there will be discussion at the Policy Board of coming to divide this Board, so that cobia would be split out. We could have a greater number of different states in the mix in the not too distant future. Is there anybody else with a comment on this motion?

MS. KERNS: You have Chris Batsavage.

CHAIR FEGLEY: Okay, Chris, go ahead.

MR. BATSAVAGE: Maya, is it possible for you to put the table up that shows the options and what the percent allocation. Yes, okay. There are two questions I have. This option was the allocation we just chose. The amount set aside for this would be 2,925 pounds, is that correct?

CHAIR FEGLEY: That's correct.

MR. BATSAVAGE: All right, and second question. I think with de minimis in the FMP, is your state's commercial landings for two of the previous three years must be less than 50 percent of the coastwide commercial landings at the same time period. Then those commented that, I guess the northern states have increased their landings in recent years.

Right now, at the point IT numbers, some of those states might not be de minimis, but they may have to fall back in. I guess maybe not a question to answer today, but I guess it's something we can think about. How many states are going to qualify just for de minimis in the future, meaning that some of these states are starting to ramp up their landings, and they are going to be non de minimis. I guess whatever option we pick, we just need to leave enough set aside for this commercial fishery, for de minimis commercial fisheries I think is probably needed, but also enough for the non de minimis states, especially under an overall commercial quota that may or may not be enough for the commercial fishery to stay in.

CHAIR FEGLEY: Anybody else with comments to the motion?

MS. KERNS: Lynn, I just wanted to add to what Chris Batsavage had just said, and that the way the Board has set up de minimis for this species. It is flexible in the way that responds to the dynamic nature of some of these catches that we are seeing, because it is two out of the three years.

It does allow for a state or jurisdiction to have a very high year in one year that still remained de minimis. I just point that out to everybody, but some of the landings that we are seeing in recent years for some jurisdictions are quite high, and may be pushing the 2,925 set-aside when you add all the states together.

CHAIR FEGLEY: Thanks Toni, yes, I remember that discussion when we set that up, and we put a lot of thought into it. Okay, anybody else with comment to the motion?

MS. KERNS: Mel Bell.

CHAIR FEGLEY: Go ahead, Mel.

MR. BELL: I was just going to say, Joe touched on it. Basically, this option kind of goes hand in glove, in my

mind, with the first action or issue that we dealt with, so kind of balances a little bit of that, if you are trying to be a little conservative, I think I was.

CHAIR FEGLEY: Anybody else?

MS. KERNS: That's all, Lynn.

CHAIR FEGLEY: If anybody would like a moment to caucus on this, please raise your hand.

MS. KERNS: Yes, there are two folks with their hands raised, Marty and Chris Batsavage.

CHAIR FEGLEY: Let's try three minutes again, so we will return at 2:25 to call the question. Happy caucusing. Okay everybody, if there is anybody who needs more time to caucus, please raise your hand.

MS. KERNS: There are no hands, Lynn.

CHAIR FEGLEY: In that case, we are ready to call the question. I'm just going to go ahead and read it again so we know**. For Issue 3 commercial de minimis set aside move to approve Option F, to account for potential landings in de minimis states not tracked in-season against the quota, 4 percent of the commercial quota or 5,000-pound cap, whichever is less, would be set aside and not accessible to non-de minimis states. Motion by Mr. Cimino, second by Mr. Bell.** Is there anybody who wants to throw a final word with this?

MS. KERNS: I see no hands raised.

CHAIR FEGLEY: Okay, so if you are in favor of this motion, please raise your hand.

MS. KERNS: I have Florida, South Atlantic Council, Georgia, South Carolina, New Jersey, Delaware, Virginia, North Carolina, Maryland, NOAA Fisheries, and PRFC. I want to make sure, and Florida, I said them already, sorry. One came in in the middle and it shifted everybody. If I didn't call your name, speak up please.

CHAIR FEGLEY: All those opposed, please raise your hand, your right hand.

MS. KERNS: Let me put everyone's hand down really quick, Lynn. There we go, now we can have opposition if we're ready.

CHAIR FEGLEY: Okay, opposition, raise your hand.

MS. KERNS: I see no hands raised.

CHAIR FEGLEY: Are there any null votes?

MS. KERNS: I see no hand raised.

CHAIR FEGLEY: How about abstention?

MS. KERNS: One abstention from the Fish and Wildlife.

CHAIR FEGLEY: The motion carries, so we now have a commercial de minimis set-aside of 4 percent of the commercial quota or 5,000-pound cap, whichever is less. Great, thank you. One more, and this is the recreational de minimis question. I just want to make sure that everybody is clear that with recreational de minimis.

The choice stands that a de minimis state will be able to match a neighboring non de minimis state, or choose from whichever size limit we're about to finalize. In other words what I'm saying is, you don't have to decide now whether you're going to match or take a 1-fish at this minimum size. We're just changing the minimum size. With that, does anybody have comments to this issue?

MS. KERNS: I see no hands raised, Lynn.

CHAIR FEGLEY: Okay, would anybody like to offer a motion?

MS. KERNS: Pat Geer.

CHAIR FEGLEY: Pat Geer, take it away.

MS. KERNS: Pat, you're on mute again.

MS. BERGER: I just sent him the audio pin. Pat, your pin number is 5403.

MS. KERNS: I know he doesn't have the best phone connection, Lynn, I don't know. Mel Bell also had his hand up to make a motion.

CHAIR FEGLEY: I'll sort of take advice on how to handle this. Do we want to give Pat a moment, or go over to Mel?

MR. GEER: I'm back.

CHAIR FEGLEY: Hi Pat!

MR. GEER: I don't know what happened. I had to put in my pin number like multiple times. I don't know why it didn't work, and I apologize. That's the first time that ever happened. All right, so everybody can hear me, right?

CHAIR FEGLEY: Loud and clear.

MR. GEER: For Issue 4, recreational de minimis size limit, move to approve Option C, a recreational de minimis state may choose to match the recreational management measures implanted by an adjacent non-de minimis state or the nearest non-de minimis state if none are adjacent, or limit its recreational fishery to 1-fish per vessel per trip with a minimum size of 33 inch fork length, or a total length equivalent of 37 inches.

MS. KERNS: Seconded by Mel Bell.

CHAIR FEGLEY: Excellent, all right, thank you very much, Mel. Is there any discussion on the motion?

MS. KERNS: We have Pat Geer with his hand up, as well as Chris Batsavage and Mel Bell.

CHAIR FEGLEY: Okay Pat, do you want to comment on your motion?

MR. GEER: Yes, I just think it is the reasonable thing to do, since the other two options only allow for 33 and 60 percent of the females are mature at those sizes. If you look at the spawning stock biomass from the stock assessment, the last couple years it has been in decline. It just seems that we want to get as many of the females up to the size where they're spawning, so this is 100 percent, I think that is a good choice to make.

CHAIR FEGLEY: Mel Bell, how about you?

MR. BELL: That was my logic, and we would have landed on this one if I had gone before Pat. It basically gives you better spawning potential and opportunity for the females to spawn, and if you think about it, we went to 33 inches years ago to try to facilitate that now. The federal side we're still 36, and we're at 36, so that just makes sense to give an opportunity to get more spawn out of them.

CHAIR FEGLEY: Excellent, thank you for that insight. Chris Batsavage, I have you on deck.

MR. BATSAVAGE: I support the motion and agree with Pat and Mel's comments. In addition, you know we've talked about kind of the limiting factors from the different commercial allocations. The recreational fishery may also be limited too. You know thinking about these fish becoming more available to de minimis states, and the fact that we monitor the recreational fishery in numbers of fish.

Going to 33 inches might prevent just the de minimis harvest that we expect to see north of Virginia in the coming years, to push us over the recreational harvest limit, especially with the high uncertainty in MRIP estimates that you see with pulse fisheries like cobia, and especially in areas that they are not very common. You just get one unlucky MRIP estimate that had a 29-inch fish that could result in some pretty high and very uncertain harvest estimates. The 33 inches is probably the safer bet here.

CHAIR FEGLEY: Good insight. Okay, any other comment on this motion?

MS. KERNS: No additional hands.

CHAIR FEGLEY: Does anybody need to caucus on this motion?

MS. KERNS: I don't see any hands, Lynn.

CHAIR FEGLEY: All right, let's do it, let's call the question then. All in favor, please raise your hand.

MS. KERNS: I have South Atlantic Council, Georgia, South Carolina, NOAA Fisheries, New Jersey, Delaware, Virginia, North Carolina, Maryland, and PRFC.

CHAIR FEGLEY: Okay, sounds like we might be missing somebody in there, when you have hands down, Toni, I'll move on.

MS. KERNS: Hands are down.

CHAIR FEGLEY: Okay, any opposed?

MS. KERNS: No opposition.

CHAIR FEGLEY: How about null votes?

MS. KERNS: No null votes.

CHAIR FEGLEY: And abstentions.

MS. KERNS: One abstention from U.S. Fish and Wildlife Service.

CHAIR FEGLEY: Very good, motion carries. The recreational de minimis size limit is move to approve Option C, for a de minimis state may choose to match the recreational management measures implemented by an adjacent non-de minimis state or the nearest non-de minimis state if none are adjacent, or limit its recreational fishery to 1-fish per vessel per trip with a minimum size of 33 inches fork length, and that is 37 inches total length. That takes us to the end of our four issues. That was excellent discussion. I very much appreciate everybody's input, and Toni is going to talk to us a little bit about implementation.

MS. KERNS: Two things that I wanted to talk about, in terms of implementation. The Board will need to decide when this Addendum is affective, so when it should be implemented by. My suggestion, if it works for all the states with the by January 1 of 2021, in order to utilize the quota split allocation, so that the states can set their measures for next year, if that can work for everyone.

Then once we decide that, then I can talk through. There are some states that need to make changes to their recreational fisheries. I haven't done the math to determine how much of a reduction Virginia needs, or how much of an increase North Carolina can have, since we just approved these new splits.

But the TC has talked about a methodology for those two states to use, and have approved the methodologies that they had come up with, knowing that you would have a short timeframe between now and the beginning of next year, in order to go through measures and approve those measures.

Now that we have a percent allocation split, those two states will go home and run the numbers, and look at different management options for their states for the next year, and then bring something back to the Commission to review and approve. We need to determine if we want to have a special in-person meeting to approve those new measures for those two states, or if the Board wants to do an e-mail vote to approve those measures.

Just to remind everybody, for the recreational measures, we do an evaluation every three years, to see how the states are performing against their measures that they've put in place. Virginia saw that they were going to need a reduction, and North Carolina saw that they could have a small increase. We'll need an implementation date here, and then a decision on whether or not we want an in-person meeting, or an e-mail vote.

CHAIR FEGLEY: Yes, so taking this one at a time, do you need a motion for the implementation date, or can we just do that by consensus?

MS. KERNS: We can do that by consensus. That works for me. Then in addition to that, Lynn, we'll need to do a final approval of the Amendment, either works.

CHAIR FEGLEY: Okay, is there any opposition to an implementation date of January 1, 2021?

MS. KERNS: I don't see any hands raised, Lynn.

CHAIR FEGLEY: Okay, so then I think by consent, we can adopt that implementation date. Then Toni, we need a motion to approve the whole Addendum right, with the implementation date?

MS. KERNS: Yes, we need a motion to approve the Addendum as modified today.

CHAIR FEGLEY: Okay. Is there anybody out there who would like to throw that out there?

MS. KERNS: Mel Bell has his hand up.

CHAIR FEGLEY: Thank you, Mel, go for it.

MR. BELL: All right, Madam Chair, I move to approve Addendum I to Amendment 1 to the interstate fishery management plan for Atlantic migratory group cobia as amended today.

CHAIR FEGLEY: Perfect. Does anybody have a second?

MS. KERNS: You have Pat Geer as your seconder. Maya, if you can say as amended today, and I'll add the additional language about to Amendment 1 for the Atlantic migratory group.

CHAIR FEGLEY: Does it need to say to be implemented January 1, or is that implicit in on the record?

MS. KERNS: Implicit on the record, we're fine.

CHAIR FEGLEY: That is the first order, and then the next is we need to decide as a Board whether or not we want to meet, I would assume it would be virtually, we want to have a virtual Board meeting to discuss changes for Virginia and North Carolina, or are we comfortable doing that by e-mail? Toni, you said that that would be in November.

MS. KERNS: It would either be late November or early December, depending on the state's process.

CHAIR FEGLEY: Okay, does anybody have a strong desire to meet in person, meaning virtually over webinar?

MS. KERNS: I don't see any hands raised here, Lynn. I can go to the public that the TC has gone through this methodology and found the methodology sound.

CHAIR FEGLEY: Okay, that's good, perfect. Now, is there any opposition if we have an e-mail vote on these two states regulatory changes?

MS. KERNS: I see no hands raised in opposition.

CHAIR FEGLEY: Everybody will be looking to their e-mails later on this fall, early winter, and we'll take a look at those two state plans.

MS. KERNS: Then Lynn, we just need a vote on this motion.

CHAIR FEGLEY: Oh yes, we do don't we? Is there any opposition to the motion on the board?

MS. KERNS: There is no hands raised.

CHAIR FEGLEY: Excellent, that is good, I almost just left it there and forgot about it. Great, thank you. **We have approved Addendum I to the Atlantic Cobia fishery management plan, so thank you, everyone for that.** I think, Toni, we get to move on to something completely different now, right?

MS. KERNS: That's correct, and Maya, if you could just write motion carries without opposition that would be great.

CHAIR FEGLEY: I wonder, we are just two minutes ahead of schedule, and we may need those two minutes. I wonder if folks want to just stand up and stretch.

MS. KERNS: Lynn, I failed to do this at the beginning of the meeting, but I just wanted to welcome Savannah Lewis as our new FMP Coordinator for the South Atlantic Board species. This is her first full meeting with the Commission as an ASMFC staff member, so I wanted to welcome her to the fun.

CHAIR FEGLEY: Thank you, Toni, and I should have done that as well. I will just say that I have worked with Savannah for a few years, she came from us at Maryland DNR. If you've not met her, she's fantastic to work with, so welcome, Savannah.

MS. LEWIS: Thank you both, I appreciate it.

REVIEW 2020 TRAFFIC LIGHT ANALYSIS FOR SPOT AND CROAKER

CHAIR FEGLEY: Okay, so we are going now, moving over to the sciaenid portion of our agenda. For that we are going to get the updated 2020 Traffic Light Analysis for Spot and Croaker. I think Dawn, you're going to kick us off, correct? I'll hand it over to you.

MS. DAWN FRANCO: It's actually Harry is going to start with Spot, I believe.

CHAIR FEGLEY: Harry, Rickabaugh. Okay, take it away, Harry.

MR. HARRY RICKABAUGH: Thank you, Madam Chair. This is going to be a tag team presentation, as Lynn just kind of alluded to. I'll be going over some issues we've had with the 2019 data, when we went to analyze the fisheries traffic light analysis for both species. Then I'll also go over the traffic light analysis for spot. Then I'll pass it off to Dawn, we will go through the traffic light analysis for croaker. Then finally, Savannah will go over the management responses needed for the traffic light analysis for both species, according to the most recent addenda.

The first issue we had as the main one would be that we did not have the values for ChesMMAP for either species for 2019. The ChesMMAP Survey was completed in 2019, but then the survey switched vessels and years, and comparison surveys were made between the new and old factors, but the gear calibration factors were not completed in time for them to provide those indices for us this year.

They will be available next year, it's not a data point that we'll be missing continually, we just don't have it at this point. Luckily, the missing values are not going to change the results of either TLAs with the stuff to use through these presentations. The second issue we had was with the VIMS Trawl Survey. We use that for the croaker juvenile index.

The index will not be available for 2019. They failed to give us the catch of an Age-1 fish in the current year as a proxy for the improvement in the previous. Since this is 2020 for 2019, it was not completed. We will not have that value. That is complementary information that is not a triggering mechanism for the croaker traffic light. But it's just information that we used to help support our decision. But we won't have that particular datapoint.

Then we also looked at NEAMAP, just looking at the latest data that is missing. We wanted to try to see if we had something to kind of fill in for ChesMMAP, as I've alluded to it, fitting with the trials was necessary, so we are going to present that in the traffic light analysis presentation as supplemental material, we're not saying we want to substitute it for ChesMMAP, but we are going to show it to you, just to show how they compare.

Then finally, not really relevant for this year, but we are going to have some more serious issues trying to complete the traffic light next year, as some surveys were not completed, or only partially completed. I'm now going to move on to spot. This will be the first year we're using the new updated traffic light analysis.

As you recall in Addendum III that was approved this year, but we made some changes. This slide just highlights those changes. Incorporating indices from the ChesMMAP and the North Carolina Department of Marine Fisheries Program 195. We revised the adult abundance indices using age-length keys and length composition information, to show that all fish were Age 1 plus to the best of our ability.

We also are now using a regional metric, so it's splitting into two regions, Mid-Atlantic and South Atlantic regions, and that split occurs at the Virginia/North Carolina border. We needed to change the reference period, the 2002 to 2012 to allow for the incorporation of ChesMMAP at the end of 2002. The triggering mechanism changed for spot to two out of the terminal three years needs to be above either of the 30 percent or 60 percent thresholds to show the abundance and harvest metric. Those thresholds did not change, they were 30 and 60 percent before. Just moving forward throughout this presentation, 2017, '18, '19 are the three terminal years. Also, just recall that even though we are using the regional metric, the stock is still managed as one-year stock, so if either region trip requires management response, then management will be across the entire coast, not just that specific region. For all these traffic light presentations, you're going to see the same sort of pattern.

They divided them by regions, so this particular one is the spot harvest composite indices. The Mid-Atlantic and South Atlantic regions would be the commercial, and the recreational harvest combined, a portion of color, so red being the one that we key in on as triggering value. The two horizontal black lines correspond to the 30 percent and 60 percent threshold.

As you can see for the Mid-Atlantic region, four of the last five years were above the 30 percent threshold, including the two terminal years. The South Atlantic region three of the past four years, including the two terminal years, and also above the 30 percent threshold. Similarly, the new graphic setup, but this is the adult abundance composite.

For the Mid-Atlantic that includes ChesMMAP and the Northeast Fisheries Science Center Trawl Survey, and for the South Atlantic the SEAMAP and North Carolina Federal Marine Fisheries 195 Survey, probably this is no doubt you found it. There it is for the Mid-Atlantic, you do not have a 2019 value, if you decided that including a single value of the North Atlantic Fishery Science Trawl Survey.

Without appropriate there would only be a composite that would give single index. It's also pretty obvious that it's above that 30 percent threshold for several years now, including what would not be the two terminal years in this case, but 2017, '18, which are two of the three terminals. We're still considering 2019 the terminal year, it's just missing the data points.

But '17 and '18, which were within that terminal three years or above the 30 percent threshold. For the South Atlantic, it has not been above the 30 percent threshold for about a decade. Those were the two components that trigger management action within the Addendum for the traffic light analysis.

We also give them supplementary information. The first piece you're looking at here is the South Atlantic Shrimp Trawl Bycatch Data. The graph on the left is the effort for the fish shrimp trawl fishery. But you can see it decline rapidly from the late 1990s to 2000, effort did, and then it kind of leveled off with a low to moderate level with a poor variable.

Status years along with the observer data in the most recent years, and also SEAMAP data, which is used to either back calculate the estimates for the years in which observer coverage did not exist. As you can see that the effort value on the left is still higher than it was in 2018 in the terminal year of 2019, but it is right within line of where it's been recently.

Whereas, the estimates of abundance currently for spot are approaching 300 million fish. That is an increase, and it's higher than it has been since 1995,

and that is due to increased abundance within the observer program in (faded out). These are the juvenile composite indices. The Mid-Atlantic region uses ChesMMAP and the Maryland Juvenile Seine Survey. Again, ChesMMAP is missing the 2019 data points. I will say that the Maryland Seine Survey was a little (word) from 2017-18, but still was well below its long-term mean, and still would be producing some sort of red within this graphic. It has been obviously above the 60 percent threshold in the Mid-Atlantic region for some time now. Conversely, in the southern region it's actually filled the last two years.

Green/yellow border within the traffic light, this is the long-term mean if you were right path. Just about a long-term mean in the South Atlantic for the past two years, and that traffic light is actually a single survey that North Carolina's Department of Marine Fisheries Program 195 Survey. The recruitment has been a little different in the Mid-Atlantic than it has in the South Atlantic. The two-fish talked about were approved in the South Atlantic and then remained a request in the Mid.

As I mentioned, we looked at NEAMAP. This is just NEAMAP only, it's not a composite index. That has been above the 60 percent threshold for juveniles and adults for the past several years. One thing to note here is that this is a shorter timeframe survey. I think this is 2007. A current reference period of 2012, 2002-2012.

For this one we had to use a different reference strategy, increasing the entire time series 2007 to '19. Again, this was exploratory, so if we wanted to try to incorporate this, we would have to try to figure out how to deal with a differing reference period, particularly for croaker more so than spot.

We may not want to truncate the reference period of the trawl survey 2007, which is what our current methodology requires all surveys to have the same reference period. One thing is the ones who include it in the future, we're going to have to deal with. If you look at the adult lower figure there, you can see that potentially, again with the reference year being the entire time series. That abundance has declined basically pretty steadily from 2007 through about 2014, and this remained at a very low level more than that survey suggests.

This kind of supports, again I guess I should mention the ChesMMAP actually does track fairly well with NEAMAP, those two surveys trend with each other much more closely than they do with the Northeast Fishery Science Center Trawl Survey, so one would suspect that ChesMMAP probably is also going to be still in a similar red proportion as it was in 2018 and '19.

We won't know until we get the data point if that completely holds true. Just to wrap up, the harvest composite trip at the 30 percent level composed of Mid-Atlantic and South Atlantic regions. The adult abundance composite tripped at the 30 percent threshold in the Mid-Atlantic but not in the South Atlantic.

Since both the harvest and abundance metrics tripped at the 30 percent level in the Mid-Atlantic region, spot management as outlined in Addendum III has been triggered coastwide. The inclusion of the missing 2019 data will not affect the trigger designation. It doesn't matter if that ChesMMAP is fully red or fully green, it will remain within the 30 percent trigger level, either the '17-'18 values were at 30 percent. They can't rise above that to the 60 percent or fall out of it and be un-triggered. With that, again I had mentioned earlier that Savannah will be going over what those management actions are that are now required to just being tripped, after Dawn presents the croaker portion of this. If you have any questions on this when I get to the management part of it at this point, I would be glad to answer them.

CHAIR FEGLEY: Thank you so much, Harry. What I would like to do is absolutely take a pause, and take any questions on spot for Harry, and then we'll move on to Dawn's presentation and deal with croaker. Do we have any questions on the spot analyses?

MS. KERN: Spud Woodward had his hand up.

CHAIR FEGLEY: Go ahead, Spud.

MR. WOODWARD: I didn't have my hand up.

CHAIR FEGLEY: You did not have your hand up, Spud?

MR. WOODWARD: No Ma'am, it's showing it up, but I didn't do that. Not sure how that happened.

CHAIR FEGLEY: Is there anybody else out there with questions for Harry on spot?

MS. KERNS: We have Bill Gorham.

CHAIR FEGLEY: All right, Bill, take it away.

MR. GORHAM: Could you go back to the landing's graphs, and could you explain how that's. That is harvest. Went too far. There we go.

MR. RICKABAUGH: What's your question, basically how this is calculated or can we just pause that? In this traffic light, potentially what you do is you take for all the traffic light analysis. We use those efforts to, in this case 2002 to 2012, but the mean of that reference period is then used to use basically the confidence on this, the 95 percent confidence limits above and below, and you actually run a regression through that.

You can then calculate the proportion of red or for green for each year for each part, the location of two things in here, the recreational landings and the commercial landings. You can see where you could have red and green. If one of them is above its reference period average it would be green, if the other one is below it will be red.

Essentially, the yellow/green border is the mean. Say you go any little bit above your mean, you're green, one confidence limit below is all yellow. Basically, when you're all yellow you are basically at your mean. Then as soon as you start to incorporate them green or red, you are above or below. I'm not sure if that explains your question or doesn't.

MR. GORHAM: Yes, it makes a little better sense now. I'm just looking at the red and saying, you know does it encompass any environmental factors?

MR. RICKABAUGH: No, these are simply based on harvest, so this is the same thing with all these indices are just based on the numbers straight from the index. The juvenile indices obviously, juvenile recruitment is highly affected by environmental systems, environmental conditions. You will see some, indirectly you may be seeing some environmental factors there, but nothing directly incorporated.

MR. GORHAM: Thank you.

CHAIR FEGLEY: Anymore questions for Harry on spot?

MS. KERNS: I don't see any other hands, Lynn.

CHAIR FEGLEY: Okay, great, and Harry, thank you again for that. Dawn, I think we'll go on and tackle croaker.

REVIEW 2020 REPORTS: SPOT

MS. FRANCO: Sounds good. I'm Dawn Franco, I was with Georgia DNR, and I am the TC Chair for Atlantic Croaker. I'm just going to take you really quick through the traffic light analysis for croaker. It's going to look really similar to what you just saw for slides, so forgive us if everything looks almost identical.

We'll start with the summaries and updates from Addendum III that was approved earlier this year, it seems like a million years ago, but it was only earlier this year. It's been very similar to what Harry told us for spot, with just a few small differences, such as in the first bullet point, we incorporated ChesMMAP, and then the South Carolina Trammel Net Survey instead of the P195 from North Carolina as the additional adult abundance survey.

The next three bullet points are much identical to what Harry said. We used the revised adult

abundance indices for the surveys, but one minor difference is we used adult, had the adult have two-year spots not one year plus for Atlantic croaker. We still have the same regional metrics, with a split at the Virginia and North Carolina border, and then we changed the survey reference time period from 1989 to 2012 over to 2002 to 2012.

Then lastly, the trigger mechanism is slightly different, we changed it to if both the abundance and harvest exceed the 30 percent or 60 percent threshold in three out of the four terminal years. The spot is two out of the three terminal years, so croaker is three out of the four terminal years. It is important to note the same thing Harry said, that even though the regional metric is being used, the stock is still managed as one unit.

If both metrics trip in one region, then management response is created in the entire region. We'll get into the traffic light analysis that is in the composite harvest, which is the recreational and commercial harvest combined. The Mid-Atlantic is on top, and it has exceeded the 30 percent threshold for the sixth year in a row, where tasking is above the 60 percent threshold.

The mean proportion red on the last three years from 2017-'19 at 68 percent, and the South Atlantic has met or exceeded the 30 percent threshold for the seventh year in a row, and their mean proportion red from 2017-19 is 46 percent. But we have not quite went over that 60 percent threshold in stock recruitment. This is the traffic light analysis for the adult abundance composite. At the very top we have the Mid-Atlantic, and you'll notice that there is no 2019 data points, because of the missing ChesMMAP Index. But same as with spot. Even without that terminal year, the Mid-Atlantic adult composite has exceeded the 30 percent threshold from 2016 to 2018, so three out of the four, and actually as far back as 2010, it went over that 30 percent threshold.

We've met the terminal mechanism, all exceeding that 30 percent, so three out of the four terminal years, and in contrast the South Atlantic adult abundance has not exceeded the 30 percent threshold since 2010. Just as a reminder that 30 that are used for this adult composite index, for the Mid-Atlantic we use ChesMMAP and NEFSC, and then for the South Atlantic we use the South Carolina Trammel Net Data and SEAMAP.

This is the shrimp trawl discards for croaker, the left is identical to what we saw plus you have this effort for the South Atlantic Shrimp Trawl fishery. As noted earlier compared to the late nineties, effort is much lower from 2005 onward, maybe a slight increase from 2005 to the present, and then left to right are the estimated croaker discards with increasing trends for croaker in recent years, with 2019 data points being the second highest over the time series.

As a reminder, these are just supplementary information, they are not currently included in the trigger mechanism. Then this is also supplementary, this is the juvenile traffic light analysis, which is not used as a trigger mechanism, but it is informative for us, as a TC and you as a Board. It's a similar trend exceeding the adult composite, with more proportion of red in the Mid-Atlantic than the South Atlantic.

Mid-Atlantic has been over the 30 percent for the past five years, and over 60 percent in the last three. South Atlantic is over 30 percent in 2015 and 2018, but below 30 percent for 2019. Again, we don't have the 2019 for Mid-Atlantic, because we used VIMS data for Mid-Atlantic, and as Harry told you we don't have the 2019 data point, or ChesMMAP, we used ChesMMAP and VIMS, so we didn't have anything.

That's pretty sad. Then for the South Atlantic we used North Carolina P195 Survey for the juvenile traffic light analysis. Just like for spot we looked at NEAMAP for the traffic light analysis. We discussed it, but we didn't incorporate it into the composite scale as of yet, and the same for spot.

It corresponds very well with what we do in ChesMMAP with declines recently exceeding 60 percent in the last five years for juveniles, but for

adults it is only over 30 percent in the last three of four years, where ChesMMAP was over 60 percent since 2008 for that adult traffic light analysis.

In your Board packets you have a lot more information, and you can see the adult and juvenile composites with the adjusted reference period needed to improve NEAMAP affairs set in 2007 to 2019. If you were curious how it would look, you can go and look at those, but spoiler alert, it doesn't change a thing, we're still over 30 percent threshold, and also work four more years for the Mid-Atlantic when you're doing that. In summary, the hardest composite trips at 30 percent for the Mid and South Atlantic, that is the recreational and commercial together, and then the abundance composite tripped at 30 percent for the Mid-Atlantic. Since both metric trips for the Mid-Atlantic, management action has been triggered coastwide for all non di minimis states. Even with the ChesMMAP plan two data point missing, we still have three out of the four terminal years over 30 percent.

Action is triggered regardless, because 2016 to 2018 goes over that threshold. I believe that is all I have for you. I'm happy to take any questions, but Savannah will cover management options. I would be happy to answer anything else, specifically about croaker.

CHAIR FEGLEY: Thank you, Dawn, very much. Well done! Do we have any questions for Dawn on her presentation for croaker?

MS. KERNS: Chris Batsavage:

CHAIR FEGLEY: Go ahead, Chris.

MR. BATSAVAGE: Thank you, Madam Chair, and thank you Dawn and Harry for the presentations on traffic light analysis. I guess this question could be relevant to both species, probably more for croaker. The shrimp trawl bycatch trends, the relatively low effort in the shrimp trawl fishery, but increased croaker discards in the last few years, while the South Atlantic Composite juvenile coastwide showed good year classes during that same time period.

Can we be looking at shrimp trawl bycatch trends alongside the juvenile abundance trend, to see if they corroborate, and determine to what degree the increased bycatch should be a cause for concern? I'm just trying to get some context to the supplemental shrimp trawl bycatch information.

MS. FRANCO: I can try to take a stab at that.

MS. LEWIS: Thanks, Dawn.

MS. FRANCO: Well, it is actually informed by the juvenile indices, I believe. What we used, I mean it's not informed by the juvenile indices, but we did talk about that when the TC was meeting earlier last month. The reason for the increase there is because both increase and the catch rate observed in the observer program, and also the increase of catch rates of SEAMAP in the last few years. You are going to have to take these with a grain of salt, and that if they are an estimate.

They are not a true number for exactly what the discards are coming off of the shrimp trawl boat. It's all just estimates based on using SEAMAP as a supplementary to what little information we have from the shrimp trawl discards. If we had a state shrimp trawl discards, if we had enough observer coverage that we could really have a handle on what those discards are, this data point might be very different. But we think this is definitely part of the increase is an artifact of the increase in the index for SEAMAP, if that is helpful.

MR. BATSAVAGE: Yes, quick follow up, please?

CHAIR FEGLEY: Sure, go ahead, Chris.

MR. BATSAVAGE: That's helpful, and yes, I know it's not a direct bycatch estimate we would get in other fisheries with good observer coverage, but I think it is good context to put in these reports, just so the public has, I guess a better understanding of what these mean and the caveats. You know originally, I was thinking of this kind of similar to what we've seen with

scup discards in the squid trawl fishery. It does raise concerns when that occurs.

But when it has, it easily coincides with some strong year classes of scup moving through the fishery. It just seemed like when reviewing the information that two of the stronger juvenile abundance indices seen in the Pamlico Sound Trawl Survey, Program 195 occurred right around the time the shrimp trawl discard bycatch estimates were also going on. Thanks for trying to answer me.

CHAIR FEGLEY: Yes, thank you, Dawn. I just want to add as Chair that you know my hair did kind of stand straight up when I saw that croaker number. I agree with Chris here that a little bit of context with the newer parts would be good. It is challenging to explain to constituents, you know what the impacts of this very large bycatch are, relative to the management we can do on the other fisheries. It's sort of a rhetorical comment I thought I would add in. Are there any other questions for Dawn?

MS. KERNS: You have Mel Bell, followed by Joe Cimino.

CHAIR FEGLEY: Okay, Mel, go ahead.

MR. BELL: Thank you Dawn and Harry. I think you may have answered by question, but it was related to the same thing with the nature of the discard data for both spot and croaker. I'm sure Lynn's hair is standing straight up was much more dramatic than mine, but that caught my attention as well. I'm curious about where that came from, if that was the observer data. It sounded like it is constructed from maybe observer plus SEAMAP and other things. Is that right?

MR. RICKABAUGH: This is Harry. You have, pretty similar to what Dawn said, but let me just clear that up in observer data. I don't know if Jeff Kipp is on the call or not, but he is actually the one that ran these, and I asked him a question about it. It is, first the observer numbers as far as I recall from a very short discussion over e-mail was both the observer coverage and the SEAMAP number were tops.

They were both driving it up, so naturally, observers could physically see more on the boat, send one back to how this relates. I guess previously, I would have to recall, but when we did the traffic light, we did try to incorporate this as a traffic light analysis. Within the TC, and I'm sure with everyone else that vetted it. It can be a little confusing, because they are juvenile fish. If you have a high discard number that basically is going to occur, usually during the largest year class, in the absence of increased effort. It's a large red number, and obviously it's never great, because you kill, in this case croaker potentially 1.5 million juvenile croaker, and 1.5 billion, I'm sorry of juvenile croaker. But it also means they were there, so we had a better year class at the same time, how much is this discard mortality limiting the future benefit of that year class? That is the piece you kind of don't know, because we don't have a good way to try to estimate how many juvenile croaker are there. Are there 10 billion? Are there 5 billion? What proportion is that 1.5 billion? That is kind of the piece of information we don't have.

MR. JEFF KIPP: This is Jeff Kipp, and I could just chime in here. What Harry said I think is completely accurate. We have seen an increase in catch rates in both SEAMAP and the observer program. Those two data sources are seeing similar trends, and as Harry pointed out, when you get a big year class that moves and becomes available to that shrimp trawl fishery, that is going to result in increased availability to that fishery and increase in catches, so that is what we're seeing in the shrimp trawl discard estimates.

CHAIR FEGLEY: Thank you, Jeff, and thank you, Harry. Joe Cimino, you were on deck.

MR. CIMINO: I was, Madam Chair, thank you. You know Harry's follow up there was perfect, it covered all my questions, but it doesn't cover all my concerns. This morning we saw the southern block from North Carolina south showing their commitment to ERPs and multispecies management for menhaden. You know here this Board continues to see struggles for

rebuilding for several ASMFC managed species, including spot and croaker, weakfish.

You know we've been dealing with these hair-raising shrimp bycatch estimates for quite a few years now, as trends have gone up. I would just encourage anything that can be done be done, including hopefully at some point better observer coverage, if this is an artifact for that. But as Harry pointed out, you know when we do see a strong year class that hopefully can feed into better recruitment for the Mid-Atlantic, and then just gets wiped out, it's really disheartening.

CHAIR FEGLEY: Thank you for that, Joe, you know I think this is something we need to keep our eye on. Are there any other questions about croaker for Dawn?

MS. KERNS: Chris Batsavage.

CHAIR FEGLEY: Okay, Chris, go ahead.

MR. BATSAVAGE: Just a follow up comment for Joe, and just for the Board's information. Of course, ASMFC doesn't manage shrimp, the states do, and North Carolina is currently looking at another amendment to the state shrimp fishery management plan that is going to address, mainly bycatch issues in the Sounds, but mostly in estuarine waters.

I know that is only a portion of where the penaeid shrimp trawl fishery occurs, but just to I guess address concerns I know many of us have, about the increasing trends in croaker and spot discard. There are management measures underway. At the state level we are addressing these longstanding issues.

CHAIR FEGLEY: Thank you for that, Chris. Anybody else with questions or comments on croaker, before we move on to management responses?

MS. KERNS: Go ahead, Dawn.

MS. FRANCO: I just wanted to follow up on what Chris said. Thank you so much, that is an excellent point that a lot of the struggle that we're seeing in spot and croaker are not necessarily from the shrimp trawl fishery, they are from a smattering of all the fisheries. Hopefully, with early regulations in place, we'll see some things changing.

But if we could go back to the South Atlantic juvenile composite index really quick. I would just like to point out that in the South Atlantic the juvenile index and the adult index, there is a lot of green in those indices, and the shrimp trawl fishery that we're looking at is specifically in the South Atlantic.

But I feel like if the shrimp trawl fishery was really having a huge effect, we would be here in the South Atlantic juvenile or even the adult composite and we're not, so I'm not sure if that alleviates anyone's fears or hair raising, but for me it makes a little bit more sense, and doesn't send that panic button off, to me personally. It's mostly in the Mid-Atlantic that we're seeing the extreme levels of red, and that is not where the shrimp trawl boats are fishing.

CHAIR FEGLEY: Thank you for that, Dawn. That was on my mind as well, as I was patting my hair back down. You know it's an interesting phenomenon, and I suppose our shrimp trawl discards are estimates. But again, I think it's just something we need to just look at as we go forward, just be cognizant of what's happening there. Any other questions, comments, before we move on?

MS. KERNS: No.

REVIEW MANAGEMENT RESPONSE REQUIREMENTS FROM ADDENDUM III

CHAIR FEGLEY: Harry, Dawn, thank you so very much for those excellent presentations, and Savannah, we will move on to you for our management response.

MS. LEWIS: I just wanted to say, thank you for the warm welcome everyone, and now I'm just going to walk through Management Response as outlined in Addendum III. Before I get into the nitty gritty, I

thought it would be really good to show you this tool put together by our science team.

This shows various scenarios in which ChesMMAP data and NEAMAP data are used interchangeably, and as Dawn and Harry both mentioned, it doesn't matter which survey data is included, 2018 or 2019, you would still see the same trends, both for croaker and for spot. What happened, both spot and croaker exceeded the 30 percent threshold triggering what's outlined as a moderate management response.

If you look at the table for both Atlantic croaker and spot, you are going to see that this requires a bag limit for fish, up to 50-fish for non de minimis states. It is important to note that moderate management response is only going to be required for states that are non de minimis. For the commercial side, Atlantic croaker and spot, states need to take a 1 percent harvest reduction from the previous 10-year average, and again this is for non de minimis states. States that already have regulations on the books are encouraged to keep the regulations. When we hit that 60 percent threshold, which we will evaluate starting moving forward, then we'll worry about more intensive management response.

Commercial needs to be a quantifiable measure, and states can establish different measures by gear area, as long as the measures implemented are quantifiable and expected to achieve the 1 percent reduction for the entire state's commercial requirements. Outlined in Addendum III for spot and croaker, measures must be in place for at least three years for Atlantic croaker, in two years for spot.

States, like I said, that have commercial regulations already in place, are encouraged to keep them in place, and the commercial measures must be evaluated by both the Technical Committee and the Board to determine if they are quantifiable and meet the requirement of the Addendum. The TC will continue to evaluate these fisheries, using only the regional abundance composites from here on out, because the harvest composites are going to be impacted by future regulations.

The next steps for the Board to talk about today is to discuss when these implementation plans will be due, and what the timeline will be. Our recommendation was to consider this at the February meeting, but again this is up to the Board. Addendum III is pretty tight, in terms of what states are required to do. If there are any additional questions on management and what needs to happen, I'll be happy to take those now.

CHAIR FEGLEY: All right, thank you, Savannah. Are there questions for Savannah about management responses?

MS. KERNS: I don't see any hands, Lynn. Oh, here we go, Bill Gorham.

CHAIR FEGLEY: Okay, Mr. Gorham, take it away.

MR. GORHAM: We talked about this internally regarding our pier fisheries, and received pretty strong public comment from a particular pier owner in regards to the persistence in this fishery, the importance as a food source to the participants, and the major negative consequences to his business, and as a food source to this strong demographic. I promised I would say it on the record, and I guess I'm wondering, asking, hoping, is there anything that can be looked at to kind of alleviate those negative consequences on the fishery in North Carolina?

CHAIR FEGLEY: I would go to Toni, but I think where we are now, you know, when we did Addendum III, was the time when we had those conversations. I don't know what we can do now. I think those sorts of things would have to happen in a future management document. But again, I'll turn my virtual head over to Toni, and see if she has anything else to say about that.

MS. KERNS: The only thing that I can think of that is a possibility is North Carolina as a state could ask for conservation equivalency to the measures, but you

still would have to put in place a measure that gave as much conservation as the triggers, the change in the management measures that are in the state. There would still be a management response, regardless.

CHAIR FEGLEY: Then Toni, that conservation equivalency would need to go through the TC.

MS. KERNS: Yes, we would have to follow the processes defined in the Guidance Document. The state would have to make a request to the Board. It would go to the Plan Review Team. The Plan Review Team would send it to the appropriate committees, the TC, the AP, Law Enforcement Committee, to evaluate the proposal, and then provide a recommendation back to the Board, and the Board would make that determination the final approval or not. Then Lynn, Chris Batsavage also has his hand up.

CHAIR FEGLEY: Okay, Bill, are you good?

MR. GORHAM: Yes, Ma'am, thank you.

CHAIR FEGLEY: Okay, Chris Batsavage.

MR. BATSAVAGE: This is a question for Savannah on calculated required commercial reductions. You might have gone through this and I missed it, so I apologize. Just so I'm clear, and if everyone else around the table is clear, as far as calculating this. Do we just simply calculate what 1 percent of our state's 10-year average landings were.

Then develop management measures to reduce our future landings by that amount, like if it was 10,000 pounds, and we wanted to do a season closure, we looked at the time of the year in which the average landings were about 2,000 pounds, and what is the season, for instance. Would it be just simply a matter of that, and of course send it back to the Committee for their review and approval?

MS. LEWIS: Toni, you can pop in here if I'm interpreting it incorrectly. The way that both the Addendums have an outline for both spot and croaker is that you have to reduce by 1 percent of the average state commercial harvest, either by season, trip limit, or size limit or anything quantifiable.

I believe the way that you were outlining that, it makes sense to make that 1 percent reduction, you have to be able to show that you're reducing by the amount off your average. Does that make sense? I wasn't around for the initial calculations, so Toni might have a little bit more insight into this conversation. But that is how I interpret it.

MS. KERNS: I believe you are correct, Savannah.

CHAIR FEGLEY: Okay, Chris, are you good with that?

MR. BATSAVAGE: I am, thank you.

MS. KERNS: Than Lynn you have Pat Geer.

CHAIR FEGLEY: Pat Geer?

MS. KERNS: Yes, Madam Chair.

CHAIR FEGLEY: Okay, go ahead, Pat. Did we lose him again?

MS. KERNS: Yes, I've got to send it to him again. I think he has a bad connection, and so it disconnects him, and then like reboots him. Then he has to send his pin in. But Shanna has her hand up, maybe she knows what question Pat is trying to ask.

MS. SHANNA MADSEN: The question was about the timeline for implementation. It looks like we're discussing maybe implementation plans going to the Board in February. When would you want states to actually implement the changes by then? We're just trying to figure things out with our regulatory process.

CHAIR FEGLEY: I think, and again Toni may be the better person, but I think what is going to happen is we're going to have implementation plans due in January for Board review in February. Those implementation plans need to include your most

expeditious timeline, if you will, for getting these implemented. The Board can see, because everybody's regulatory process is different, it's going to take a different amount of time. The hope would be that everybody has something on the ground in 2021, but that regulatory timeline needs to be included.

MS. MADSEN: Okay. I might want to comment on that. I hate to step on Pat's toes, I'm not sure if he is back yet. For Virginia, we do want to make sure that we're including our fishery in this process, and we do want to take some time to sit down with our advisory committees and meet, regarding how we want to take the commercial cut, as well as we know what the bag limits are of the recreational side of things.

But I do know that as far as a timeline is concerned, we have our advisory committees meeting regarding cobia right now. We were intending on being able to have our advisory committees meet, hopefully in January, but I'm not sure that we would be ready to submit an implementation plan in January, just depending on when that primary falls. Just saying it's a little bit tight for Virginia regulatory wise, for us to be able to get things in motion without being able to talk to our industry first.

CHAIR FEGLEY: Toni, do you have any thoughts about that?

MS. KERNS: I can try to help out, Lynn. I think that the Board can have a discussion here today, and come to an agreement of what everybody can do. Unfortunately, the Addendum doesn't have a specific timeline, as I think Savannah mentioned. It is our intention that it would be in the next fishing year.

We recognize though that turning something around in two, three months' time is very difficult for states to do so in following their administrative process. If the Board collectively wants to set an implementation timeline, so that then we can do that, and then everybody would be working towards the same date on the books. I don't know what other states regulatory impediments are, outside of this, but it would be my hope that something could be on the books, at least no later than the end of 2021. It would be great if we could get something on the books before then in 2021 though. Then when I was speaking, I think Jim Estes hand went up. I don't know if he wants to speak or not.

CHAIR FEGLEY: Jim Estes.

MR. JIM ESTES: Actually, Toni answered the question I was going to ask, thank you.

CHAIR FEGLEY: Okay, good. I guess what I'm wondering is, it seems like one of the things. I guess I'm wondering if we bumped up the deadline for the implementation plan to February. I'm wondering if there is a way for the Board to approve those again over e-mail, or in some sort of virtual webinar, so that sometime in February we all understand where everybody is in the process of their implementation. I'm worried if that's possible, and if there is any state that cannot achieve that.

MS. LEWIS: Madam Chair, if I can just have a comment. This is just a reminder that because it is a moderate management response, it's only states that are non de minimis in commercial or recreational that have to implement these measures. If you're a state, you'll need to check, which we'll go over at the end of this meeting whether your state is de minimis or have requested de minimis status for your commercial or recreational croaker fisheries.

CHAIR FEGLEY: Yes, right. I don't remember off the top of my head who all those are. I know that the state of Maryland has to ask for spot, but not for croaker. I'm still wondering for those non de minimis states, like Virginia, that is under a really tight, for them it's difficult, if this February implementation date would work, because I think even though it's just the non de minimis states. I mean to act the whole Board needs to approve those plans, right?

MS. KERNS: That is correct.

MS. LEWIS: It has to go through the technical committees first before the Board gets them.

CHAIR FEGLEY: Right, which is why I'm wondering if the plans to be due in February to the TC. I hate to put Board approval off all the way to spring, but I guess I would ask Virginia or any state if the Board approved implementation plans in May after the spring meeting, how quickly could you turn around and implement, put the regulations on the ground from there?

MS. KERNS: Pat Geer and then Chris Batsavage.

CHAIR FEGLEY: Go ahead, Pat.

MR. GEER: I apologize, I don't know what's wrong with my phone. I have to put in the code every time I want to speak. We're in the process of looking at the regulations now, and we have to form them from scratch, we don't have any regulations from spot and croaker. But we can work on that. We could possibly have it done by the spring. I mean it only takes us, for a new regulation it will take a little bit longer, probably 60 to 90 days to get everything completed.

CHAIR FEGLEY: Okay, Chris Batsavage, why don't you say what you were going to say, and then I'll weigh in.

MR. BATSAVAGE: Thanks, Madam Chair. Our administrative process is pretty fast, it's just getting the time to look at the information to determine what might be an appropriate season closure, for instances, for the commercial fisheries, and what kind of input we get from stakeholders in our state.
Your idea of maybe pushing the implementation plan back until around February for the TC review, and then Board approval sometime after that with things in place by the spring would work for us. Just kind of thinking about this too. You know for a state like us, who is currently thinking about maybe a season closure for spot and croaker, you know at times when the landings aren't really high. The longer we go into 2021 without anything the less options we have for putting in season closures. Just the way the spot and croaker commercial fisheries are in North Carolina, they would probably happen at different times of the year, if we go with the strategy of looking at when the landings seem to tail off, and take the season closures then to avoid turning too many landings into discards.

This is kind of my thoughts after listening to the discussions here in the last few minutes, as far as take our time. But on the recreational side, it's always better to implement new measures earlier in the fishing season than during the middle of the season, especially in the summer when you have a lot of folks from out of state fishing along the coast. Regulation changes tend to not be very effective when they go into place then.

CHAIR FEGLEY: Toni, when is the February, the winter board meeting? Do you know the dates of that?

MS. KERNS: I believe that it is actually the very last week of January this year. Bob, am I correct? Am I remembering that correctly, Bob?

EXECUTIVE DIRECTOR ROBERT E. BEAL: No, it will still be the first week of February.

MS. KERNS: I lied, sorry. Obviously, everybody is getting pretty good at webinars here. We can do a special board meeting sometime, let's say in March that leaves enough time to have the plans due in February, and then the Board can meet virtually to approve the plans. For a quick meeting, I don't think it would take too, too long, so it wouldn't be too much of folk's time, and wouldn't be an all-day meeting, or anything like that. That is a possibility.

CHAIR FEGLEY: Yes, I think in order to make this work and keep it equitable. I really agree with what Chris said that if you wait too long, especially earlier in the season is better. I think we're going to need to do something especially for this. I'm just wondering if we can make the plans to on the 15th of February, if two weeks is enough time for the TC, could we have a first week of March special Board meeting to review the implementation plans, approve them, and then set

everybody on their way? Does that sound reasonable to folks?

MS. KERNS: As long as everybody turns in their plans on time. I think it's only fair to give the TC a couple, at least three or four days to review those plans once they have been turned in.

CHAIR FEGLEY: Well two weeks is what I was thinking.

MS. KERNS: Two weeks, and then the TC would need to be able to write a report, and then let you all have it in your hands for a couple of days as well.

CHAIR FEGLEY: Yes. Okay, so if the plans are due February 15, and the Board would have a special meeting the second or third week of March. That is a month between the time we turn the implementation plans in, and in the time the Board can approve them. Is that too fast still?

MS. KERNS: No, I think that is fine, Lynn.

CHAIR FEGLEY: That would mean we would be approving these things mid-March, and then as I understand from Virginia. Pat, does that give you time in Virginia to do what you need to do, or are you already out into say May and June at that point?

MR. GEER: No, I think we'll be okay, it's just that it's the timing with cobia, and having to do this and get our workgroup and our advisory committees together. But we're working on the regulation now. We can implement, we can probably have this done by April, if we go with not having to do it until the 15th.

CHAIR FEGLEY: Okay, is there any non de minimis state that has to act that would have a problem with implementation plans due, please on time, February 15, and then a special Board meeting in that Ides of March timeframe, March 15?

MS. KERNS: Lynn, you have Jim Estes with his hand up, and then you do have a member of the public that has his hand up as well.

CHAIR FEGLEY: Jim, why don't you go ahead, and then we'll go to the public.

MR. ESTES: The timeframe that you suggested for having the implementation plans ready, and we don't have a problem with that. I think you were very logical about taking a month for the TC to look at these, and then for us to get back together to approve them. Our slowdown is going to be in our administrative process.

If we do something that is somewhat controversial, I don't think that this will be, but I'm always surprised. Our next Commission meeting is in May, and we could have things actually on the books by June. If, however, I am surprised like I usually am, and there is some controversy. We have to have two meetings.

Therefore, we would not have our next meeting until July, which would mean implementation probably, I'm guessing, about the middle of September. If that is satisfactory that is what we can do. But if not, I'm not certain what I can do to fix that, if that makes any sense to you.

CHAIR FEGLEY: No, it makes perfect sense. Again, I refer to Toni and to the Board, but I think you know the way these things work, is that we're all bound by our administrative processes. I think the crucial thing is that the Board sees, and we know that each state is (interference). If you're bound to pop in Florida, I don't necessarily think you would, but Toni, if you have any thoughts there, lay them on me.

MS. KERNS: Lynn, I think you described that perfectly. Typically, in the past the Board, as long as the Board can see a state is working towards implementing measures there has not been an issue. Again, it's to the pleasure of the Board.

CHAIR FEGLEY: Okay, so let's hear from the public, and then we'll try to wrap this piece and tie a bow on this piece if we can.

MS. KERNS: Lynn, the member of the public is Greg, is it Ludlum?

MR. GREG LUDMAN: Greg Ludlum, Owner Seaview Fishing Pier, North Topsail Beach, North Carolina. I sit here and I listen to a lot of this, a lot I agree with and a lot I don't. A lot of things that are not taken into consideration. You take 1 percent commercial cut, and you cut 75 percent of the general public, which is you know the way it goes.

In my business, people don't realize that we service the handicap, the ones that can't afford boats, the ones that can't afford to go to the fish market. My people eat what they catch, 75 percent of the people come every year for spots, to come to 50 fish a day. I took this up with Chris Batsavage a while back, and said at least 75. But I guess I've got it chiseled in stone.

Now I've got to go back through the people that need this in their freezers, and these are the people that are fishing the piers that we're taking cuts and cuts and cuts, at all the time, with no help from anyone in the industry. Probably the largest fishing industry in North Carolina is the pier fishing. I just wanted to put that out there, and let everybody know when they make these votes who they are really affecting. That's all I have to say, thank you.

CHAIR FEGLEY: Thank you very much for your comment. We appreciate that. These decisions are never taken lightly. Okay, so I guess at this point what we'll do. I would propose this timeline of implementation plans being due the middle of February, February 15. I am not looking at a calendar, so I don't know what day of the week that is.

MS. LEWIS: It's a Monday and it's Presidents Day.

CHAIR FEGLEY: How about we take it to the Friday before that.

MS. KERNS: That would be February 12.

CHAIR FEGLEY: That would be out of everybody's hair before Valentines' Day and Presidents Day. Then we will convene the Board, hopefully briefly, somewhere the Friday closest to March 15, to approve this plan and send us all on our way.

MS. KERNS: Thanks Lynn, and we'll doodle poll everybody around that time to find the best date for a Board meeting.

CHAIR FEGLEY: Okay, and is there any opposition to that course of action?

MS. KERNS: I see no hands, Lynn.

CONSIDER FMP REVIEW AND STATE COMPLIANCE FOR 2019 FISHING YEAR FOR RED DRUM

CHAIR FEGLEY: Awesome. All right, thank you everybody for that. I think with that we are at our final piece, we're almost home with 15 minutes to go. Savannah, you're going to do compliance and FMP Review, correct?

MS. LEWIS: Correct.

CHAIR FEGLEY: All right, take it away.

MS. LEWIS: Maya, do you just want to show it on your screen? Would you mind?

MS. MAYA DRZEWIKI: Savannah, I can control the PowerPoint if you would prefer.

MS. LEWIS: Okay, I've got it now, so we're good. Today I'm going to walk through, I'm going to bring us home with three different species. We've already heard a lot about cobia and Atlantic croaker, so I'm going to be a little light on those. If you have additional questions at the end, please let me know.

I'm going to start off with red drum. The Plan Review Team met in September, 2020. Total coastwide red drum landings in 2019 were approximately 4.8 million pounds. This represents a roughly 3.4-million-pound decrease from 2018, and is below the previous ten-year average of 6.9 million pounds. The commercial

fishery harvested about 1 percent, with the recreational fishery harvesting 99 percent of the total.

Coastwide commercial landings have varied, and then in 2019 that they decreased to 58,000 pounds from 2018, when they were at 145,000 pounds. The majority of red drum commercial harvest comes from North Carolina. Red drum are assessed as two stocks, one in the Mid-Atlantic from North Carolina north, and the other in the South Atlantic from South Carolina south.

In 2019, 80 percent of the total landings came from the South Atlantic region where the fishery is exclusively recreational. The other 20 percent came from the Mid-Atlantic. This continues the trend of the last 30 years, in which the majority of the harvest comes from your recreational fishery in the South Atlantic.

Recreational harvest of red drum peaked in 1984 at 2.9 million fish, which the harvest is the blue bar here. The yellow is the alive releases, and then the black line is the percentage of the harvest that was released. In 2019, recreational harvest decreased from 2.3 million fish in 2018 down to 1.5 million fish in 2019. This 2019 harvest failure is below the previous 10-year average for recreational harvest in numbers and in count. Florida anglers landed the largest share of the coastwide recreational harvest in numbers, with about 40 percent of total recreational harvest, followed by South Carolina and Georgia. Anglers release far more red drum than they keep. The percent of the catch released has hovered around 80 percent since the 1990s. In 2019, 11.6 million fish were released, which is about 89 percent of their recreational catch.

The most recent coastwide stock assessment was completed in 2017. This assessment indicated that the abundance of young fish from both the northern and southern stock have remained fairly stable since 1991, and that sSPR has been above the overfishing threshold since 1995. Therefore, neither stock is likely experiencing overfishing at this time.

There is a great amount of uncertainty on red drum, and since it is beginning its next stock assessment, we have the data webinar coming up, so stay tuned for updates on that over the next couple years. The PRT met and reviewed all the state compliance reports, and put together the fishery management plan review.

They found that all states have implemented the requirements on Amendment 2. They asked the Board consider approving state compliance reports and de minimis requests from New Jersey and Delaware. Additional research and monitoring recommendations can be found in the FMP review document. They remain unchanged from the previous year, but several of the recommendations are being evaluated in the stock assessment that is ongoing.

On the table it shows that New Jersey and Delaware both meet the percentage for de minimis, red drum doesn't really have a firm de minimis, but the PRT chose to evaluate individual state contributions. Both qualify, and both states have had de minimis in the previous years. Now for the Atlantic croaker fishery management plan review.

The Plan Review Team met in October of 2020. In 2019, 4 million pounds total was landed for Atlantic croaker. This represents a 91 percent decline in total harvest since 2003, with which the harvest was 47.4 million pounds. There has been a 92 percent decline in commercial harvest, and a 90 percent decline in recreational harvest.

Respectively commercial harvest makes up 53 percent of total landings, with recreational making up 46 percent, 2019 is the lowest data point in the time series. The majority of commercial landings come from North Carolina, followed by Virginia. This graph just shows percent deletes, so you have the blue bars representing the landings, the red bars represent the number released alive, and the black line represents the percent released alive.

Recreational anglers released approximately 19.6 million fish, which is about 78 percent of the total catch. This is a slight increase from previous years. When the PRT met and reviewed all of the state compliance reports, they did find that all states have implemented requirements of Amendment 1.

They asked that the Board consider approving the state compliance reports, as well as the de minimis request for New Jersey, for both your recreational and commercial fisheries, Delaware, South Carolina, Georgia and Florida for their commercial fisheries. The table below outlines whether each state qualifies for de minimis status in their recreational and commercial. Commercial and recreational de minimis criteria are based on a 1 percent total of the coastwide average 2017 through 2019 landings in each fishery. New Jersey has a new request this year to be de minimis for both commercial and recreational, and they do qualify. Delaware, South Carolina, and Georgia have all previously been de minimis, and requested again this year for their commercial fisheries. Florida has previously been de minimis.

Their commercial landings were slightly higher this year, so they got pushed over that 1 percent threshold, so they no longer qualify, but they do ask based on the prior de minimis status to get de minimis status again, and the PRT agreed to give Florida one additional year of de minimis status and revisit it next year.

Additional research and monitoring recommendations found in the FMP Review Document remain unchanged from previous years. Finally, I'm going to bring us home with Atlantic cobia. The Plan Review Team met in October of 2020. What you see here in this graph, harvest is represented in blue, red represents releases, and the black line represents the percent release.

Recreational catch harvest in live releases, recreational harvest was 97 percent of total landings, with 3 percent in commercial. Virginia has the majority of the commercial landings in 2019. The commercial fishery, as we discussed earlier, was closed last year on September 4, because it was protected to meet the total annual catch limit.

Virginia also had the highest proportion of recreational harvest, with over 80 percent of total landings in pounds and number of fish. The PRT met and reviewed the state compliance reports and put together the FMP review. The PRT found that all states have implemented the requirements of Amendment 1.

They ask that the Board consider approving state compliance reports and de minimis status for the recreational and commercial fisheries in New Jersey, Delaware, Maryland, and for the commercial fishery in Georgia. All states do meet this requirement, we discussed earlier, it seemed like a long time ago. But the de minimis status for cobia is your landings have to be under a percentage for two out of the three previous years, because it is evaluated on the three-year table.

All these states qualify for de minimis, and all have had de minimis in the past. We did receive a last minute de minimis request, PRFC. They are requesting de minimis status for both of their cobia fisheries. For the recreational they do not have an MRIP estimate, because it's linked in with Maryland and Virginia.

The commercial fishery does qualify, because two of the last three years are under the 2 percent of the total coastwide fisheries. It has varying landings in the last four years, but overall, they still do remain in de minimis, and it was an oversight in their compliance report. They ask that the Board consider approving their de minimis status for both.

They would like to make sure that their commercial fishery isn't going to be just a fluke, and they just want some more time to collect again. With that the Board action is the PRT asked the Board to consider approving all of the FMP reviews, all the state compliance reports, and all the de minimis requests as you see here in the bullet points, so that you can just

check because it was pretty easy, which states requested de minimis for which species. I'll come back to this, but with that I'm happy to take any comments or questions in the meantime.

CHAIR FEGLEY: All right, great job, Savannah. Any questions on this part of our agenda?

MS. KERNS: Chris Batsavage.

CHAIR FEGLEY: Hey Chris, go ahead.

MR. BATSAVAGE: Thanks Madam Chair, and thanks Savannah for walking us through the FMP reviews. A question on croaker regarding de minimis status. If a state is granted de minimis status now, but in the next couple years, the next year or two no longer qualify for de minimis status, because their harvest commercial landings go up. Would they be then required to implement reductions put forward in Addendum III?

MS. LEWIS: My understanding is that they will be, and de minimis is evaluated on an annual basis, so if we consider approving a state this year, it doesn't mean that the Board will approve them the following year, and then they will be required to enact everything from the Addendum.

MR. BATSAVAGE: Yes thanks, yes, I just wanted to make sure I understood that. Okay, that was my one question, and whenever you're ready I have a motion.

CHAIR FEGLEY: Okay, are there any other questions for Savannah?

MS. KERNS: I don't see any hands raised, Lynn.

CHAIR FEGLEY: All right, good, take it away.

MR. BATSAVAGE: I move to approve the 2020 FMP reviews and state compliance reports and de minimis request for red drum, Atlantic croaker, and Atlantic cobia.

MS. LEWIS: Maya, you can take over the screen and put that up if you would like.
CHAIR FEGLEY: Do we have a second?

MS. KERNS: Jim Estes.

CHAIR FEGLEY: All right, is there any comment on the motion?

MS. KERNS: Lynn, just to put on the record, these are all of the de minimis requests that were in this compliance report that Savannah reviewed.

CHAIR FEGLEY: Yes, so that includes PRFC.

MS. KERNS: I just wanted to get that on the record.

CHAIR FEGLEY: Yes, so it includes PRFC, correct?

MS. LEWIS: Correct.

CHAIR FEGLEY: Yes, okay. Again, are there any comments on the motion?

MS. KERNS: Phil Langley.

CHAIR FEGLEY: Phil, go ahead. Phil Langley, do you have a comment?

MR. PHIL LANGLEY: I'm sorry, it was hit accidental.

CHAIR FEGLEY: Okay, I'm going to quickly just read the motion. Move to approve the 2020 FMP reviews, state compliance reports and de minimis request for red drum, Atlantic croaker, croaker and Atlantic cobia. Motion by Mr. Batsavage, second by Mr. Estes. Is there any opposition to this motion?

MS. KERNS: I don't see any hands, Lynn.

MS. FEGLEY: All right, this motion carries by consent, and I think that leaves us with three minutes to spare to the end of our agenda, except we have other business. Is there any other business to come before the Board?

MS. KERNS: I don't see any hands, Lynn.

ADJOURNMENT

CHAIR FEGLEY: Excellent, and is there any opposition for a motion to adjourn? Thank you everybody so very much for all of your great discussion, I really appreciate it. Hope you all have a great night, and we get to see each other in person again soon. Thanks.

(Whereupon the meeting adjourned at 4:00 p.m. on October 20, 2020.)

Atlantic States Marine Fisheries Commission

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MEMORANDUM

TO: **Coastal Pelagics Management Board**

FROM: **Cobia Technical Committee**

DATE: **April 12, 2022**

SUBJECT: **TC Recommendation on Cobia Quota Block**

TC Members in Attendance: Angela Giuliano (TC Chair, MD), Nichole Ares (RI), Mike Auriemma (NJ), Somers Smott (VA), Anne Markwith (NC), Justin Yost (SC), Chris Kalinowsky (GA)

ASMFC Staff: Toni Kerns, Emilie Franke, Tracey Bauer

Others in Attendance: Chris Batsavage (NC), Will Poston

The Cobia Technical Committee (TC) met via webinar on March 23, 2022 to discuss the quota block timeframe for cobia and to discuss future specification development and the timeline for the next cobia stock assessment.

Current Quota Block Background

The current quota block is 2020-2022. In February 2020, the Board (formerly the South Atlantic Board) set the total harvest quota for the 2020-2022 fishing seasons at 80,112 fish, of which 92% was allocated to recreational harvest and 8% to commercial harvest in 2020 per Amendment 1. In 2021, the allocation of that total quota changed through Addendum I with 96% allocated to recreational harvest and 4% to commercial harvest. Using the previously approved total quota of 80,112 fish, this new allocation resulted in a recreational quota of 76,908 fish and a commercial quota of 3,204 fish (73,116 pounds) effective January 1, 2021.

Some states implemented new recreational cobia measures in 2021 based on Addendum I. As approved by the Board, Virginia and North Carolina changed their measures based on evaluation of previous landings against their new soft target recreational harvest limits. Virginia's 2021 measures were designed to reduce recreational harvest by 42% and North Carolina's 2021 measures liberalized regulations for recreational private anglers only. Some *de minimis* states also adjusted their 2021 recreational measures based on the updated *de minimis* requirement in Addendum I[1].

[1] A recreational de minimis state may choose to match the recreational management measures implemented by an adjacent non-de minimis state (or the nearest non-de minimis state if none are adjacent) or limit its recreational fishery to 1 fish per vessel per trip with a minimum size of 33 inches fork length (or the total length equivalent, 37 inches).

TC Recommendation: Change the Quota Block to 2021-2023

Since the 2021 changes in quota allocation and regulations occurred in the middle of the current 2020-2022 quota block, the TC discussed whether to shift the quota block to align with those management changes. If the current 2020-2022 quota block is maintained, then the Board would consider new specifications later this year for the 2023 fishing season. If the quota block is shifted by one year to 2021-2023, then the current total quota of 80,112 fish would apply to the 2023 fishing season; the Board would then consider setting new specifications next year for the 2024 fishing season. Per Amendment 1, the Board can set specifications for up to three years.

The TC recommends the Board change the cobia quota block to a timeframe of 2021-2023 for the following reasons:

- This would align with the new sector allocations and new regulations implemented by some states in 2021.
- When new specifications are considered for 2024, there would be two years of data available under the new regulations (2021-2022) instead of just one year.
- The current total quota of 80,112 fish was a conservative quota level with a projected maximum probability of being overfished of 0.25; maintaining this quota level in 2023 carries a low risk.
- The current quota level was based on projections of constant annual harvest of about 2.4 million pounds. Realized harvest in both 2019 and 2020 was below 2.4 million pounds. Although preliminary data indicate 2021 harvest was over 2.4 million pounds, the average harvest of 2019-2021 is still below that level. The TC and the Plan Review Team will continue to closely monitor final 2021 harvest data and preliminary 2022 data to inform future specifications.

Future Specification Development and Next Stock Assessment

The most recent cobia assessment (SEDAR 58) had a terminal year of 2017. The next SEDAR stock assessment for the Atlantic cobia would be an operational (i.e., update) assessment tentatively scheduled for 2025. The terminal year would likely be 2023 or 2024 and the assessment would likely be available to inform 2026 management.

If the Board changes the quota block to 2021-2023, the TC will develop specification options next summer for the 2024 fishing season. Since a new assessment will not be available yet, the TC will continue to use the projections provided by NOAA following the last assessment and will work with NOAA to discuss the possibility of any additional projections or information, if needed, while also considering the high levels of uncertainty around these projections.

Finally, regarding considerations for future specifications and assessments, the TC noted the importance of monitoring year-to-year changes and variability in state landings. The TC also noted recent data indicating overlap of Atlantic cobia (managed from Georgia north) with Florida (managed separately as part of the Gulf cobia group).

Atlantic States Marine Fisheries Commission

Sciaenids Management Board

May 2, 2022
2:15 – 4:15 p.m.
Hybrid Meeting

Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary.

1.	Welcome/Call to Order *(C. Batsavage)*	2:15 p.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings from August 2021	2:15 p.m.
3.	Public Comment	2:20 p.m.
4.	Consider Red Drum Simulation Assessment and Peer Review Report **Action** • Presentation of Red Drum Simulation Assessment Report *(J. Ballenger)* • Presentation of Peer Review Panel Report *(A. Schueller)*	2:30 p.m.
5.	Progress Update on Black Drum Benchmark Stock Assessment (*J. Kipp*)	3:45 p.m.
6.	Other Business/Adjourn	4:15 p.m.

The meeting will be held at The Westin Crystal City (1800 Richmond Highway, Arlington, VA; 703.486.1111) and via webinar; click here for details

MEETING OVERVIEW

Sciaenids Management Board Meeting
May 2, 2022
2:15 – 4:15 p.m.
Hybrid Meeting

Chair: Chris Batsavage (NC) Assumed Chairmanship: 02/22	Technical Committee Chairs: Black Drum: Harry Rickabaugh (MD) Atlantic Croaker: Dawn Franco (GA) Red Drum: Lee Paramore (NC) Spot: Harry Rickabaugh (MD)	Law Enforcement Committee Representative: Capt. Chris Hodge (GA)
Vice Chair: Vacant	Advisory Panel Chair: Craig Freeman (VA)	Previous Board Meeting: August 3, 2021
Voting Members: NJ, DE, MD, PRFC, VA, NC, SC, GA, FL, NMFS (10 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from August 2021

3. Public Comment – At the beginning of the meeting public comment will be taken on items not on the agenda. Individuals that wish to speak at this time must sign-in at the beginning of the meeting. For agenda items that have already gone out for public hearing and/or have had a public comment period that has closed, the Board Chair may determine that additional public comment will not provide additional information. In this circumstance the Chair will not allow additional public comment on an issue. For agenda items that the public has not had a chance to provide input, the Board Chair may allow limited opportunity for comment. The Board Chair has the discretion to limit the number of speakers and/or the length of each comment.

4. Consider Red Drum Simulation Assessment and Peer Review Report (2:30-3:45 p.m.) Action

Background

- In 2020, the Board initiated a simulation modeling process so the Red Drum Stock Assessment Subcommittee (SAS) could determine the most appropriate assessment strategy for red drum.
- The SAS simulated red drum populations to test a variety of assessment modeling techniques and identify the techniques(s) best suited for tracking red drum population dynamics in the next benchmark stock assessment. The Red Drum Technical Committee provided a report of the simulation assessment for peer review. (**Briefing Materials**)
- A peer review workshop for the Red Drum Simulation Assessment was conducted from March 28-30, 2022. The Peer Review Panel summarized their findings with respect to the TORs for review and made recommendations on the model(s) best suited for the next benchmark stock assessment. (**Briefing Materials**)

Presentations

- Overview of the 2022 Red Drum Simulation Assessment by J. Ballenger.

- Peer Review Panel Findings by A. Schueller.

Board actions for consideration at this meeting

- Consider the Red Drum Simulation Assessment and Peer Review Report

5. Progress Update on Black Drum Benchmark Stock Assessment (3:45-4:15 p.m.)

Background

- At the 2021 Summer Meeting, the Board approved the initiation of a Stock Assessment Subcommittee (SAS) to begin the Benchmark Stock Assessment Process for black drum.
- A black drum SAS was formed and has met several times to develop the benchmark stock assessment. A Data Workshop was held in December 2021 and a Methods Workshop was held in February 2022. An Assessment Workshop is expected to be held in July 2022.
- A peer review workshop for the black drum benchmark stock assessment is tentatively scheduled for December 2022.

Presentations

- Stock assessment update by J. Kipp.

6. Other Business/Adjourn

Sciaenids Management Board

Activity level: High

Committee Overlap Score: Moderate (American Eel TC, Bluefish TC, Menhaden TC, Weakfish TC)

Committee Task List

- Red Drum SAS – Conduct Red Drum Simulation Assessment
- Black Drum SAS – Conduct Black Drum Benchmark Stock Assessment
- Spot TC – Review State Proposals for Regulation Changes
- Atlantic Croaker TC – Review State Proposals for Regulation Changes
- Atlantic Croaker TC – July 1: Compliance Reports Due
- Red Drum TC – July 1: Compliance Reports Due
- Atlantic Croaker TC – Conduct 2022 Traffic Light Approach analysis for Annual Meeting
- Spot TC – Conduct 2022 Traffic Light Approach analysis for Annual Meeting
- Black Drum TC – August 1: Compliance Reports Due
- Spotted Seatrout PRT – September 1: Compliance Reports Due
- Spot PRT – November 1: Compliance Reports Due

TC Members:

Atlantic Croaker: Dawn Franco (GA, Chair), Kristen Anstead (ASMFC), Tracey Bauer (ASMFC), Stacy VanMorter (NJ), Michael Greco (DE), Harry Rickabaugh (MD), Somers Smott (VA, Vice Chair), Morgan Paris (NC), Chris McDonough (SC), Joseph Munyandorero (FL)

Black Drum: Harry Rickabaugh (MD, Chair), Jeff Kipp (ASMFC), Tracey Bauer (ASMFC), Craig Tomlin (NJ), Jordan Zimmerman (DE), Ethan Simpson (VA), Chris Stewart (NC), Chris McDonough (SC), Ryan Harrell (GA), Shanae Allen (FL)

Red Drum: Lee Paramore (NC, Chair), Jeff Kipp (ASMFC), Tracey Bauer (ASMFC), Alissa Wilson (NJ), Michael Greco (DE), Robert Bourdon (MD), Ethan Simpson (VA, Vice Chair), Joey Ballenger (SC), Chris Kalinowsky (GA), Roger Pugliese (SAFMC)

Spot: Harry Rickabaugh (MD, Chair), Jeff Kipp (ASMFC), Tracey Bauer (ASMFC), Stacy VanMorter (NJ), Michael Greco (DE), Somers Smott (VA), Morgan Paris (NC), Chris McDonough (SC), BJ Hilton (GA), Joseph Munyandorero (FL)

Spotted Seatrout (PRT): Tracey Bauer (ASMFC), Douglas Lipton (MD), Joey Ballenger (SC), Chris Kalinowsky (GA)

SAS Members:

Red Drum: Joey Ballenger (SC, Chair), Jeff Kipp (ASMFC), Tracey Bauer (ASMFC), Angela Giuliano (MD), Lee Paramore (NC), Jared Flowers (GA), Chris Swanson (FL)

Black Drum: Harry Rickabaugh (MD, Chair), Jeff Kipp (ASMFC), Tracey Bauer (ASMFC), Margaret Conroy (DE), Chris McDonough (SC), Dr. Hank Liao (VA), Trey Mace (MD), Linda Berry (NJ)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

SCIAENIDS MANAGEMENT BOARD

Webinar
August 3, 2021

These minutes are draft and subject to approval by the Sciaenids Management Board.
The Board will review the minutes during its next meeting.

Draft Proceedings of the Sciaenids Management Board Webinar
August 2021

TABLE OF CONTENTS

INDEX OF MOTIONS

ATTENDANCE

Board Members

Joe Cimino, NJ (AA)
Tom Fote, NJ (GA)
Adam Nowalsky, NJ, proxy for Asm. Houghtaling (LA)
John Clark, DE, proxy for D. Saveikis (AA)
Roy Miller, DE (GA)
Lynn Fegley, MD, proxy for B. Anderson (AA) Chair
Russell Dize, MD (GA)
David Sikorski, MD, proxy for Del. Stein (LA)
Pat Geer, VA, proxy for S. Bowman (AA)
Chris Batsavage, NC, proxy for K. Rawls (AA)
Jerry Mannen, NC (GA)
Mel Bell, SC, proxy for Phil Maier (AA)
Malcolm Rhodes, SC (GA)
Doug Haymans, GA (AA)
Spud Woodward, GA (GA)
Erika Burgess, FL, proxy for J. McCawley (AA)
Marty Gary, PRFC
Jack McGovern, NMFS

(AA = Administrative Appointee; GA = Governor Appointee; LA = Legislative Appointee)

Ex-Officio Members

Dawn Franco, Atl. Croaker Technical Committee Chair
Harry Rickabaugh, Black Drum & Spot Technical Committee Chair

Staff

Robert Beal
Toni Kerns
Tina Berger
Lisa Carty
Pat Campfield
Kristen Anstead
Emilie Franke
Lisa Havel
Chris Jacobs
Jeff Kipp
Savannah Lewis
Kirby Rootes-Murdy
Sarah Murray
Mike Rinaldi
Caitlin Starks
Deke Tompkins

Guests

Mike Armstrong, MA DMF
Pat Augustine, Coram, NY
Rob Bourdon, MD DNR
Dick Brame
Mike Celestino, NJ DEP
Derek Cox, FL SWC
Jessica Daher, NJ DEP
Jennifer Farmer, VMRC
Anthony Friedrich, SGA
Alexa Galvan, VMRC
Matt Gates, CT DEEP
Lewis Gillingham, VMRC
Helen Heumacher, USFWS
Harry Hornick, MD DNR
Raymond Kane, MA (GA)
Adam Kenyon, VMRC
Kathy Knowlton, GA DNR
Wilson Laney
Mike Luisi, MD DNR
Loren Lustig, PA (GA)
Chip Lynch, NOAA
Shanna Madsen, VMRC
Chris McDonough, SC DNR
Allison Murphy, NOAA
Kennedy Neill
George O'Donnell, MD DNR
Gerry O'Neill, Cape Seafoods
Morgan Paris, SC DENR
Will Poston, SGA
Olivia Siegal, VMRC
Ethan Simpson, VMRC
David Stormer, DE DFW
Mike Waine, ASA
Craig Weedon, MD DNR
Angel Willey, MD DNR
Chris Wright, NOAA
Renee Zobel, NJ FGD

These minutes are draft and subject to approval by the Sciaenids Management Board.
The Board will review the minutes during its next meeting.

The Sciaenid Management Board of the Atlantic States Marine Fisheries Commission convened via webinar; Tuesday, August 3, 2021, and was called to order at 3:15 p.m. by Chair Lynn Fegley.

CALL TO ORDER

CHAIR LYNN FEGLEY: Good afternoon everyone. Welcome to the Sciaenid Board. My name is Lynn Fegley; I represent the state of Maryland, and am honored to serve as your Chair today.

APPROVAL OF AGENDA

CHAIR FEGLEY: I think we have a pretty straightforward agenda. By the first order of business, I'll ask if anybody has any requests for changes to the agenda, or is there any opposition to the agenda? If anybody wants a change, or has a problem with it, please raise your hand.

MS. TONI KERNS: I Have no hands, Lynn.

CHAIR FEGLEY: Fantastic. I will say that we're going to make a really minor adjustment. I guess I should have said this first. There is an action item listed for Item 5, which is a black drum TLA and stock assessment. We actually do not need action there. That is really just going to be an update for the Board.

We do have the single action item having to do with the croaker and red drum FMP Review, so that is going to be the extent of our action items today.

APPROVAL OF PROCEEDINGS

CHAIR FEGLEY: The next order of business would be approval of the proceedings that are in the meeting materials. These are the proceedings from the spring meeting, March of 2021. Does anybody have any changes to be made, or issues with the proceedings? If you do, please raise your hand.

MS. KERNS: I have no hands.

CHAIR FEGLEY: Great, fantastic.

PUBLIC COMMENT

CHAIR FEGLEY: All right, we'll move right along to Number 3, which is Public Comment. Is there anybody from the public who would like to address the Board about something that is not currently on the agenda, please raise your hand?

MS. KERNS: I don't see any hands.

CHAIR FEGLEY: Okay.

REVIEW TRAFFIC LIGHT ANALYSIS FOR SPOT AND ATLANTIC CROAKER

CHAIR FEGLEY: So the first meaty item we have here is to Review the Traffic Light Analysis for Spot and Atlantic Croaker. This is going to be the update TLA for the 2020 fishing year. We're going to get some recommendations along with this, because of some missing data issues due to COVID, and due to some survey calibrations. Looking forward to a good presentation, and I will hand it off to Dawn Franco and Harry Rickabaugh.

MR. HARRY RICKABAUGH: Thank you, Madam Chair, this is Harry Rickabaugh. I'm going to go ahead and get started. I believe, Maya, you're going to switch the slides for me. I'm going to go over the first two parts of this for the impacts of the data from the COVID-19 pandemic. We have quite a few, and then I will go over the 2021 Traffic Light Analysis for spot. Then I'll turn it over to Dawn, and she will go over the 2021 TLA for Atlantic croaker.

Okay, so the first one here actually is not so much COVID related, as the ChesMMAP Survey had a gear and vessel change in 2019. They did do some side-by-side comparison tows with the new and old vessel and gear, but the calibrations have not been completed as of yet, to be able to basically convert the old data into the new unit, so that we can compare the old and new vessels.

We do not currently have a 2019 or 2020 ChesMMAP Index. The survey did conduct sampling in 2020, so we will have that data eventually. But for this year we are missing both of those, which

that survey is used in the adult index for both spot and croaker, and the juvenile index for spot as well, so we're going to be missing those.

Again, they should have the calibrations done by the spring of 2022, so hopefully we'll have the 2019, 2020, and 2021 for you next year. Several other surveys did have issues directly related to the pandemic. The Northeast Fisheries Science Center Survey multispecies bottom trawl and the SEAMAP bottom trawl, neither of those were conducted at all in 2020.

We're completely missing those values. The SEAMAP survey is used both in the croaker and spot adult index, as well as in informing the shrimp trawl discard information. We have to mention that we also produce a supplementary information. We'll get to that later on, but we don't have those values, and also the Northeast Fisheries Science Center trawl is also used in adult index for both croaker and spot in the Mid-Atlantic region.

A couple of their state surveys were also affected. The North Carolina Program 195, which is a trawl survey, is used in the spot adult and juvenile indices, and the croaker juvenile indices. It did survey in 2020, but it was limited. They did not do any overnight trips, and only from stations that were relatively close to a port. They sampled 28 of their 54 usual samples.

The VIM survey also did some sampling in 2020 that is used as a croaker juvenile index. Only sampled in June however, and not all areas were sampled. That whole time series has been recalibrated by VIMS, to only include that time and those sites that were sampled the entire time series, to give us something to look at for this year, as something maybe we'll look at doing differently, or ask them to do differently in the future.

But that's all we have available to us for now that came available last minute, so that is what we had to work with. We appreciate them getting us something. I also via MRIP data, it is affected through the lack of some APAIS sampling within states. The effect was different state to state, as many of you probably know.

MRIP still estimated values for all states, but they used some computed data from the previous two years. That varies from state to state by species, but that is just to let you know that even though estimates are available, they aren't completely relying on 2020 data. Similarly, commercial data is available, but there could be some impacts to the pandemic through reduced demand for certain species. That is something we can't really quantify, as it varies by species by species and area by area. But likely there could have been some reduced effort due to reduced market demand.

Next year the TC will evaluate a lot of the missing data points, when hopefully we have 2021 and 2019 data on either side of the missing, the gaps basically to try to determine how we're going to fill those. For both of these traffic light analyses, both TCs decided the best course of action was not to report on any of the triggering indices, like the composite indices, where we combine two together.

If one was missing, we didn't present that, because of composite index. We're listing that as unknown for now, and hopefully we can fill that in and better update you next year. Just as a reminder, management action was tripped in 2020, and put in place in 2021 for both species. For spot, I'm going to move into the spot TLA now.

For spot the measures cannot be relaxed until 2023. Essentially, these TLAs we're looking at an update for the Board, and the only real thing that could happen would be a trigger at the next higher level, the 60 percent level, since both species did trigger at the lower 30 percent level. For spot, this is the harvest composite, so this includes both recreational and commercial harvest, split out by the Mid-Atlantic and South-Atlantic Region.

The top figure being the Mid-Atlantic, as you can see in 2020, it was below the 30 percent threshold. For spot the triggering mechanism is two of the previous three years, so since both 2018 and 2019

were above the 30 percent threshold, spot still would have been triggered in the Mid-Atlantic Region in 2020.

In the South Atlantic you can see that the proportion of red has been somewhat higher and consistently high through about the last five years was 54 percent red in 2020. Again, that would have equaled a tripped index, as it is all three of the final three years. Just as a reminder, since we did trigger management action in 2020, and we put it in place in 2021.

The harvest composite will not be able to trigger management action, or indicate that management action is no longer required moving forward. The regulations we put in place should reduce harvest, meaning it will increase the amount of red, so it's kind of a negative feedback loop, if you will.

The more we ratchet down landings through regulation, we're going to artificially, in theory at least, increase the amount of red. Of course, the regulations we put in place weren't large reductions, so it is possible that we could see steady or even declining red if we have improvement and recruitment, and/or survivability of either species.

For the adult abundance composite, the Mid-Atlantic uses the Northeast Fisheries Science Survey and the ChesMMAP survey, and as I mentioned in the beginning, we do not have the ChesMMAP survey for both 2019 and 2020, so we're considering that status unknown for this year, because we only have one of the terminal three years. As you can see, the last eight years we do have available were above the 30 percent threshold, which is why we're currently triggered, but until we get that ChesMMAP data, and can backfill the 2020 value that we're missing from the Northeast Fisheries Science survey, we're not going to know whether that has improved or moved, find out whether it's increased.

In the South Atlantic however, the past more than 10 years have been below the 30 percent threshold from the adult composite index, which is the SEAMAP survey and the North Carolina Program 195 trawl survey. You actually see some increasing green towards the end of the time series. Again, we're missing 2020, but in this case, it was two of the terminal three years were below the 30 percent threshold. This one would not have tripped.

This is supplementary information, as I alluded to earlier in the presentation, and it's the shrimp trawl discard estimates. The graph on the left is the upper, which declined pretty steadily into the early 2000s, and has been somewhat variable at a lower level since. The right figure is the actual estimates in millions of fish discarded.

As I mentioned, SEAMAP was not available, but the estimate is informed by both SEAMAP and the observer coverage. Both of those are used for the actual catch portion of the estimate. We did have observer coverage data. However, there was no coverage from April through July, due to the pandemic.

Even though the coverage is available, it's not full year coverage as in previous years. Looking at, the TC did look at the comparison of just SEAMAP, I'm sorry, the abundance estimates with and without SEAMAP, so just the observer coverage, or the observer coverage and SEAMAP. They tracked fairly well.

There are one or two years where they don't trend together, but there are several years where if they are trending in the same direction, one would be significantly higher or lower than the other, such as the 2019 you'll see on the graph is a pretty high estimate, and that was driven more by SEAMAP than the observer coverage.

We use the SEAMAP, it was originally used in the estimate to look at hindcast back beyond when observer coverage was available, so that's how we're getting estimates back to 1990. This is the juvenile indices for spot. These are not composites, they are individual indexes for each region. The Mid-Atlantic uses the MD Seine Survey, which was not affected by the pandemic.

It was conducted as it usually would be. As you can see, the values have been very low, we have high proportions of red for approximately 10 years, and then in 2020 we did have a value that was above the reference period mean. In the South Atlantic, there you see more variability. Again, the North Carolina index was available, even though it was limited sampling, it was just over 50 percent of samples were conducted.

It did show a higher level of red, but there have been some more above the mean indices for the South Atlantic Region in the juvenile index in recent years. This is a summary table, so it just summarizes the metrics that do trigger management action by region. The lightly blue shaded area is the actual metric. Then on the right we have the three years that would be used to trigger management action, and what the outlook was for each of those years. But again, for the Mid-Atlantic harvest, we had two of the three years in red, above the 30 percent threshold in red, excuse me, with the 2020 value being just below that. The South Atlantic we're looking at 52 to 59 percent red for all three years.

Now we'll move down to the adult abundance index. Again, we're considering the Mid-Atlantic unknown, because two of the previous three years we do not have a value for. The South Atlantic adult index we do not have the 2020 year, but we do have two of the previous three. Those years were below 30 percent red, and actually had more green than red in each of those years.

For the overall status, we're considering it could be triggered at the 30 percent level, even though we are missing some of that data. We can't definitively say that we are triggered, but since we're already in the trigger, we triggered previously in the previous year, we can't change major action anyway.

In reality, we have to remain status quo, and fortunately we don't have any of these values for the 60 percent red that are available. We are looking at the increased level of action anytime soon. With that I will take any questions on either the spot TLA or the missing 2020 datapoints.

CHAIR FEGLEY: Great, thank you, Harry, that was an excellent presentation, very much appreciate the thought that you guys put into this issue of missing data. Are there any questions for Harry?

MS. KERNS: Looks like he's stumped the Board, Lynn. I don't see any hands.

CHAIR FEGLEY: Wow, good job, Harry. Okay, well seeing no questions, let's go ahead and move on to Dawn, I think you're up.

TECHNICAL COMMITTEE RECOMMENDATIONS

MS. DAWN FRANCO: All right, thank you so much. As previous years, it's going to be very similar for what I talk about for croaker as what Harry talked about for spot. Harry, thanks for setting me up so nicely. For Atlantic croaker, just like Harry said, management action was tripped in 2020, and then management actions were put into place early 2021, and those will be continued until 2023.

Then these are the harvest composites for the Mid-Atlantic and South Atlantic Regions, and again these are recreational and commercial landings combined for these two. In the Mid-Atlantic we have exceeded 30 percent for the seventh year in a row, with the past three years triggering at above 60 percent, so 2017 is a little tricky, because it looks like it is 60 percent, but it's actually 59.2 percent.

Officially, only 2018 and 2020 are above 60 percent. Then the South Atlantic, we have exceeded 30 percent for the eighth year in a row, indicating continued concern for these graphics. Then we have our adult abundance composite indices, and as stated earlier, we do have several data gaps, so for the Mid-Atlantic we do not have data points for 2019 and 2020 because of ChesMMAP calibration. Then also, no data points for any NEFSC trawl for 2020. It just made more sense to leave it at 2018, rather than have a bunch of unknowns in there. The 2018 datapoint for the Mid-Atlantic is actually 58.5, so we did not officially meet or exceed 60

percent in the past three out of the four years, because remember this is different than spot that we have three out of the four previous years, rather than two out of the three.

Also, you might notice the South Atlantic abundance graphic is a little bit different than what was in the report. We had included 2020, but we decided to cap it at 2019, because we were missing the SEAMAP data that was only data from the South Carolina trammel net survey. In this graphic, we only went through 2019.

But we haven't exceeded even 30 percent, it's been mostly green for the South Atlantic adult abundance since 2010. I believe that covers everything for that one. The adult abundance and harvest are about the same as what we saw last year, triggering at about 30 percent for the last three out of the four years.

Then again, this should look very similar, especially on the left for net hours fished. For the shrimp trawl fishery that is exactly the same as you saw for spot, slightly different for the discards in millions of fish. It's a little bit different, but follows the same trend just like Harry was saying. We looked at it split out for CPUE for observer data versus SEAMAP data, and it trends well, but there was a higher estimate of CPUE for SEAMAP in 2019, which we think is influencing that 2019 data point.

Then 2020 is only the observer data, we do not have SEAMAP data to fill in that gap just yet. This is also another supplemental piece of information. The juvenile indices fell again in the Mid-Atlantic, only through 2018, because we do not have the ChesMMAP data, but hopefully next year we can update everyone with those gaps filled in, but as you can see, we have a fair amount of red still in the Mid-Atlantic region for the juvenile abundance composite.

The lines are not filled in for us, so we are still below 0.6, except for 2018, or below 60 percent. Then similar to spot we have more green than red in the South Atlantic juvenile composite, which really technically isn't a composite for the South Atlantic, because it's only the North Carolina 195 survey.

Then we come to our final slide that breaks all of the info that I just shared down into a neat little package, to demonstrate if we have exceeded, trips our trigger. The Mid-Atlantic composite harvest triggered at 60 percent, with the South Atlantic remaining at a 30 percent level. That was for the harvest composite, where we have all data available.

Then we have several unknown values for the adult abundance index, and even if we assume the worst-case scenario of unknowns being above the 50 percent, that would not be enough to trigger further management action, because we would not have three out of the four years above 60 percent.

Therefore, final status is Atlantic croaker remains triggered at the 30 percent level. Then by the next TLA, we should have ChesMMAP calibrations to refill in the data holes from 2019 and 2020, and hopefully mechanisms to fill in the other 2020 data gap. The TC recommended maintaining the course, and no further management action is suggested at this time. I will take any questions that you might have.

CHAIR FEGLEY: Thank you, Dawn, excellent presentation. I just want to say for the record that the number of those shrimp trawl discards still boggles my mind. But I think we're good. I think we dodged a little bit of a bullet here, because everything is remaining in line with where we've been. Since we've all implemented management actions for 2021, we'll be able to hold until next year and see what we get when we analyze the 2021 update. With that, are there any questions for Dawn, or any throwback to Harry. Please raise your hand if you have a question.

MS. KERNS: Pat Geer.

CHAIR FEGLEY: Go ahead, Pat.

MR. PAT GEER: I guess this question is for Dawn. I'm just kind of wondering. I'm looking at Figure 7 that is showing the discards of croaker in the Southeast Atlantic in the shrimp fishery, but the decline that we're seeing there, part of that has to do with the implementation of the requirement of bycatch reduction devices, which occurred in the late '90s.

I'm wondering if that dataset should be truncated to that point, because the introduction of the bycatch reduction devices obviously has had an impact on bycatch, so those large numbers that you see in the early '90s, are probably not representative of the fishery at all today.

CHAIR FEGLEY: Savannah, could you go back to that slide so we could see what Pat is referring to, or Dawn, whoever is controlling the screen.

MS. SAVANNAH LEWIS: I think it's Maya. I think Maya is controlling the slide.

CHAIR FEGLEY: Sorry, hi Maya.

MS. FRANCO: He needs Slide 14.

MR. GEER: Figure 7 is what it was in the document. There you are, right there.

MS. FRANCO: Yes, I think that's a great point for us to bring back to the TC and discuss, because that is absolutely what is causing the major decline, very high discards in the early '90s. Yes, I think it's a great point, Pat. I think we should definitely discuss, and I don't know if the shorter timeline would be an issue for some people. I'm not entirely sure, but definitely a good point.

MR. GEER: The behavior and how the fishery is propagated after that, you know requiring a total excluder device, and requiring the bycatch reduction devices, all flow with bycatch, you know substantially. I would think that any data that we use should be doing post bycatch reduction device.

MS. FRANCO: I will definitely make a note of that, thank you.

CHAIR FEGLEY: Okay, thanks Pat, and thanks Dawn. Any other questions?

MS. KERNS: I don't have any other hands, Lynn.

TECHNICAL COMMITTEE RECOMMENDATIONS FOR A TRAFFIC LIGHT ANALYSIS AND BENCHMARK STOCK ASSESSMENT FOR BLACK DRUM

CHAIR FEGLEY: All right, well thank you very much for the presentation, and the next item on our agenda, we're going to move over to black drum, and talk about the TC recommendations for a traffic light analysis and a benchmark stock assessment. We talked a little bit about this the last Board meeting, and I believe that Harry has got some updates for us, so Harry, take it away when you're ready.

MR. RICKABAUGH: Just before I move on to this, I just would like to thank Chris McDonough from South Carolina for the traffic light analysis. He did pretty much all the analysis for both spot and croaker. This year was particularly challenging with all the data gaps, and having to bounce back and forth for TC recommendations.

I forgot to mention that before I started that presentation. I didn't want to leave him out, he did most of the work. On the black drum, I'm going to give a little bit of background on the previous assessment. The TCs previous conversations about assessment timing, and then I will go on to just a brief overview of the TCs discussions, deciding between a benchmark assessment and a traffic light analysis, and then the recommendations the TC came out of from that discussion.

The first, well it was the first stock assessment for black drum, was conducted in 2014, but data through 2012. We looked at a few different data poor modeling structures, and the preferred model by both the Stock Assessment Subcommittee and the Peer Review Team was the depletion-based stock reduction analysis.

It did provide reference points, which were accepted by the Board for management use, was early 2015. Now those reference points obviously were derived using the previous telephone-based estimate surveys from MRIP, so we cannot currently compare our reference points to evaluate stock status to the current plan.

That was one of the major, I guess drawbacks, shortly after we finished that assessment, was that change, and then we weren't able to evaluate the stock again to those reference points. The TC met in 2019, to review data and decide on the timing of the next assessment, which was originally scheduled for 2020 for the year prior to the previous scheduled assessment.

At that point the TC recommended delaying the assessment to 2022, to allow for a longer time series in a couple of the surveys, and to also allow for some aging of archived age structures. The TC also recommended that the next assessment be a benchmark and not an update. That was one of the other things we debated quite a while back then, and decided that it would be best to try to improve on the model structure.

The peer review of the previous assessment did recommend trying to incorporate an index into either the DB-SRA or one of the other model options we tried, to see if we could get something a little better, a little more informative of the stock status. Then of course, the PRT met, as you well know, before the last Board meeting, and recommended to the Board that we look at the traffic light analysis to monitor the stock status in between, until we do another assessment. Partially probably based on the fact that we did not decide to do the previous assessment on time, and that we delayed it, and also because it's been quite a while since we've had some method to actually look at where the stock is.

The TC did meet earlier this year, April of this year, to evaluate the available data again, and discuss the use of a TLA or an assessment. Both the Stock Assessment Team from ASMFC and the TC were in agreement that trying to do both at the same time was not going to be probably a successful endeavor.

They are both very time involved, and trying to develop a TLA from scratch is probably a little more involved than most people would realize, and doesn't necessarily use some of the same techniques, or you wouldn't want to use the indices in the same way. It's not really just adding on, it's a whole different project.

We decided we needed to do one or the other, and so we looked at which we thought would be better for evaluating the stock in the near term. The TC met, and we discussed the pros and cons in pretty much a good bit of detail, actually. I'm just going to summarize up for you really quick, I'm not going to go into a whole lot of detail.

This particular Board, of course, is familiar with TLA, since we've been using it for spot and croaker, so I'm not going to give a lot of background on that either. For a stock assessment, our current schedule is a five-year cycle, which means basically it will only be updated every five years, unless we have a reason to run an update early, due to stock status, or to get delayed again it wouldn't be done on a five-year schedule, where a TLA is generally updated annually.

A stock assessment does provide a very technical report with tables and figures that are peer reviewed, and a peer review report as well, giving recommendations for how the stock assessment could be improved in the future in its strengths and weaknesses. Where a TLA is usually developed outside of a peer review, there is a little less technical document, which could be a plus or a minus.

It is easier for a less technical audience to interpret the final product than a stock assessment may be. A stock assessment does produce reference points that are calculated within the assessment, and then those reference points can be used to calculate a response, if needed, for management. In other

words, if we would cross the threshold and decide we need to reduce by a certain amount.

We could at least use our reference points to have a good gauge on how much we would need to reduce to get that. Where with a traffic light, threshold is generally assigned through, it's a lot more subjective. There is not like really a mathematical way to determine exactly at what percentage red you would need and then for how many years.

There is a little more professional judgment in there, and to determine at what level you're going to trigger how many years you need to be there, and because of that, that makes the management response not be able to be calculated from the traffic light itself. It would have to be done outside, which means there is a little bit of a disconnect there from the level triggered to then, you would have to use some other data, or if you did have a stock assessment reference point to use, you would use that. With the stock assessment, we could also update that if we had, say a management put into place, and we wanted to see whether we were moving in the right direction. You could run the update and see where you're at.

Where with a traffic light, generally it's almost the opposite, particularly if you're relying heavily on fishery dependent data, such as landings. Once you trigger management action, as I had mentioned in the croaker and spot, that you really can't then use those data to see if you are making progress, because of the negative feedback.

The more you cut back landings, the higher those fishery dependent indices and/or values will be in the red, as opposed to showing you an improvement. Also again, if you trigger management action, it could reduce which metric you could use, and as I'll touch on later, the TC thought that we probably would be heavily reliant with this particular species, on fishery dependent data.

For the stock assessment, the peer review of the last assessment, and the TC, both agreed that probably having some sort of guardrail metric, which I think in the assessment they call it roster of metrics, but the same sort of idea, where aside from just a reference point that we can identify some, either indices or other metrics that look like they may not be something we can incorporate into the assessment itself, but may be giving us beneficial information such as juvenile indices, or even some adult indices.

We can track those as well. In other words, if we were between, say the target and the threshold, we could look at these metrics, and see if they were trending up or down as well, and see how concerned we should be. This would be kind of a way to have something to evaluate annually, similar to a traffic light, as opposed to just waiting five years to run the assessment again.

Some of the discussion the TC had on the data and on the comparison of a traffic light to a stock assessment were, first the data issue with the MRIP. As mentioned before, the previous assessment did not use the current MRIP estimates, because they weren't available, obviously. Comparing the two, the newer estimates do tend to be higher, particularly in the most recent years, which likely is just going to move the values of the stock assessment up.

Everything will probably just higher abundances and reference points is probably what the bottom line would be there. The proportion of released alive fish has increased, which isn't surprising. It's likely attributed to the minimum size limit that was required by the FMP when it went into place.

There has been a recent increase in recreational trips targeting black drum, according to the MRIP estimates, which is likely due to effort shifting from other species, such as weakfish remain depleted, increased size limits and truncation of the season for summer flounder and a few other species. Then the TC all agree, one of the big points though, is we felt we did need to update these reference points, since we cannot currently evaluate the reference points from a previous assessment. We felt that

was highly needed. We still are probably going to be in a data poor structure, the data we looked at, we probably don't have enough to advance the model beyond that. We probably can make improvements within that data poor modeling framework, to make a more solid stock status to provide to the Board. Setting reference periods for the TLA would be somewhat difficult.

A lot of the independent indices we have aren't very long time series, which is a very long-lived species. Ideally you would have one generation time or at least close to it. That would be tough to do, we basically are using an entire time series as our reference period. Evaluation of the data didn't really reveal a really good coastwide, long term, independent index, which is another thing that is going to hinder us moving from a data poor assessment.

I would also, as I mentioned earlier, necessitate us relying heavily on removals for TLA, which isn't ideal, considering once you trigger then that kind of limits your ability to use the TLA to see where you're at. The take home message from the TC, our recommendation would be to go ahead and conduct the next benchmark stock assessment as scheduled in 2022.

As already touched upon earlier, we will provide updated reference points. It is going to probably remain a data poor approach, but we may be able to improve on our current DB-SRA model, and we will attempt to identify or if possible, guardrail metrics, which could help monitor the stock along with the reference points on an annual basis, rather than wait five years for the next assessment. With that I'll take any questions.

CHAIR FEGLEY: All right, thank you, Harry. Just a quick question for you. You said that you would begin working on this assessment in 2022, and is it scheduled for completion in 2022 as well, or would we see the results in 2023?

MR. RICKABAUGH: I believe it's scheduled for completion in 2022. I would have to defer to ASMFC staff to be certain what they would think would be possible with that.

MR. JEFF KIPP: Hi, this is Jeff, I could jump in.

CHAIR FEGLEY: Thanks, Jeff.

MR. KIPP: Yes, so it would be scheduled for 2022, so we would anticipate the assessment at least by the Technical Committee being completed in 2022. There have been some occurrences where a peer review might happen, like the following January. Not completely clear on timing yet when that peer review would occur. But the assessment would be completed by the TC and out to peer review by 2022.

CHIAR FEGLEY: Excellent, thank you for that. I just want to say, I think this approach makes sense. I think getting that updated MRIP data into a benchmark is critical, and if we're in a place where we can get reference points for this fishery, I just think that's such a more powerful and effective management tool than the traffic light. I appreciate your deliberations on this. Are there any questions from the Board?

MS. KERNS: Just giving a second to see if any hands went up, but I currently do not have any hands raised, Lynn. Harry is really good at stumping today.

CHAIR FEGLEY: It's been a long day, and I think good job on behalf of our presenters making it all so clear.

CONSIDER ATLANTIC CROAKER AND RED DRUM FMP REVIEW AND STATE COMPLIANCE FOR THE 2020 FISHING YEAR

CHAIR FEGLEY: Okay, well, seeing no questions we will then move right along to Agenda Item Number 6, where we Consider Atlantic Croaker and Red Drum FMP Review and State Compliance for the 2020 Fishing Year. Just a reminder to everyone. I will be looking for some motions at the end of these

presentations and discussion. Savannah, I think it's off to you.

MS. LEWIS: Hi everybody, good afternoon. Thank you, Madam Chair for the opportunity to present this today. I'll keep this pretty brief, but I'm going to be presenting the Red Drum and Atlantic Croaker Fishery Management Plan Review. I'm going to start with red drum. For red drum the PRT did meet, and we did overhaul some of the sections of this review this year to include, regional breakdowns of the different metrics.

In 2020, 56 percent of the total landings came from the southern region, where the fishery is exclusively recreational. Here on this graph the southern region is represented in the blue bars, and the northern region in the green bars. These shifts are a significant change from the 2019 regional split, where 20 percent of total landings of recreational landings were from the northern region, and 80 percent from the southern.

Recreational landings were estimated to be 2.5 million pounds in the northern region, a 173 percent increase from the 2019 estimates. North Carolina is estimated to have the most recreational landings, followed by Virginia. Recreational landings were estimated to be 3.3 million pounds in the southern region, which is a slight decrease from 2019 estimates.

Florida is estimated to have the most pounds of recreational landings, followed by South Carolina. These two figures show recreational removals by region, with northern removals on top, and southern removals on the bottom. You can see the different colored bars represent the number of fish landed, as well as estimated dead discards.

The number of fish caught in the recreational fishery was just over 670,000 fish, which is up 120 percent from 2019 for the northern region. It is estimated that 8 percent of released fish die as a result of being caught, which gives us an estimated value for dead discarded fish of about 290,000 in 2020.

Recreational removals from the northern region fishery are estimated to be about 962,000 fish in 2020. The number of fish caught in the southern region recreational fishery was about 1 million fish, again a decrease from 2019. It is estimated that 8 percent of released fish die, and as a result there is an estimated 420,000 dead discarded fish in 2020. Recreational removals from the southern region of the fishery are estimated to be about 1.4 million fish in 2020. This graph shows the removals compared to their releases. What you can see here is northern and southern regions, and I apologize for the color, I couldn't get them to match, but the bar graph on the bottom is representative of what we just saw, with total removals as the bars from the northern region in blue bars and the southern region in green bars. The releases for each region are the line graphs. Releases for the northern region are green, and southern region are blue. You can see that the number of releases far exceeds the total removals from each region. The number of fish released in the northern region was 3.6 million fish, which compared to the removals was 962,000 fish.

The number of fish released declined to those in 2019 for the southern region, with 5.3 million fish released, and compared to total removals of 1.5 million fish. There is a correction in the report. On Figure 4, the proportion of regional sector-specific landings to total coastwide landings, the green for the northern region represents recreational, not commercial fisheries, and that has been updated since.

The PRT met and reviewed all state compliance reports, and compiled the FMP Review. The PRT found no inconsistencies from the FMP for any of the states. The TC recommends the approval of state compliance reports and *de minimis* status for New Jersey and Delaware. New Jersey and Delaware requested *de minimis* status through the annual reporting process.

While Amendment 2 does not include a specific method to determine whether a state qualifies for *de minimis*, the PRT chose to evaluate an individual

state's contribution to the fishery by comparing the two-year average of total landings of that state to that of the management unit. New Jersey and Delaware each fit this *de minimis* criteria.

De minimis doesn't exempt either state from any requirement, but may exempt them in the future for management issues, implemented through addenda to Amendment 2. The PRT also met and revised the research recommendation section for red drum. They picked four key goals that they thought the Board should be informed of in research needs.

One such is the continued collection of length composition and age data, if possible, to better inform recreational discards for red drum. Collecting critical adult red drum data, including continued sampling and expansion of adult red drum surveys, as well as additional data on abundance, size, age, sex composition, and maturity of adults, as well as senescence in female red drum, and the impacts of the catch and release fishery on adult red drum stocks.

They also want to highlight the effects of the environmental factors on stock density and year class strength, and encourage the support and continued research to evaluate the social and economic value of this very important, and primarily recreational fishery. With that I'm going to move into the Atlantic Croaker Fishery Management Plan Review.

This graph here shows total commercial and recreational landings. Total Atlantic croaker harvest from New Jersey through the east coast of Florida in 2020 is estimated at 5 million pounds, which is a 30 percent increase from 2019. The commercial and recreational fisheries harvested 16 percent and 83 percent respectively.

This total represents a large shift from the previous ten-year average split, where traditionally commercial has previously been 52 percent and recreational 47 percent. In 2020, landings are estimated to be about 10.6 million fish or 4.1 million pounds, which is a 91 percent increase in the number of fish, and 121 percent increase in fish weight. Virginia was responsible for the majority of 2020 recreational landings in numbers of fish, followed by Florida. It is important to note that due to the COVID-19 pandemic, some MRIP data was imputed to fill in missing data, and the percent of imputed data ranged from 0 percent up to 70 percent, depending on the state. In 2020, anglers released 31.7 million fish, which you can see here on the black line.

Landings and live releases are indicated in the blue and red bars. Anglers released an estimated 75 percent of their recreational Atlantic croaker catch, which is slightly down from the highest ever recorded in the time series in 2019. The PRT met and found no inconsistencies among states, with regard to the FMP requirements.

The TC recommends approval of state compliance reports and *de minimis* status. New Jersey, Delaware, South Carolina, and Georgia applied for *de minimis* status for their commercial fishery. New Jersey and Delaware applied for *de minimis* status for their recreational fisheries. Just a reminder that *de minimis* for Atlantic croaker is by fishery and not combined.

There are additional research and monitoring recommendations found in the FMP review document. The PRT really wanted to highlight to the Board that continued and new research into the impacts of climate change on the range of the species is a high priority. For Atlantic croaker, Florida realized in their *de minimis* review process that they no longer qualified for *de minimis* as they historically have been for commercial Atlantic croaker.

Seeing this, they went ahead and submitted a state implementation plan to be in compliance with Addendum III. A copy of the implementation plan was included in supplementary materials. The TC did meet to review it, and found it to be technically sound, and recommended it for approval. Their proposal was for a commercial vessel limit of 1,200

pounds in state waters, which is projected to reduce 10-year average by 1.6 percent. With that I'm happy to take any questions.

CHAIR FEGLEY: Great, thank you, Savannah. It's good to give your voice a little rest. Are there any questions for Savannah on these items, before we move to action? Does anybody have a question?

MS. KERNS: I have Pat Geer followed by Marty Gary, and then Roy Miller.

MR. GEER: Savannah, I just was curious. I don't know if I missed it or not. Are there any studies that have recreational discard mortality rates for croaker?

MS. LEWIS: I'll have to double check the report. I believe they're in there. I don't know if I included it in the presentation, but I will double check for you, if you give me just a second.

CHAIR FEGLEY: Okay, and so I'll move on to Marty for questions, while Savannah is checking that out. Marty, go ahead.

MR MARTIN GARY: Savannah, hopefully these are softball questions for you. On red drum, I might have totally missed it, but the geographic demarcation for the northern and southern region. Is that the North Carolina/Virginia border? I was wondering where that is. That was my first question, and then a quick follow if I could. I don't know if it's a reach, based on what you're presenting today, but just curious about. It looks like the numbers on the landings for the northern region, if you fit a line to it, they've gone up quite a bit, and I was just wondering if that might be speculated to be a function of range expansion from climate change. You know, if the FMP Review doesn't really shed light on it that's fine. We can wait until the appropriate time with an assessment for that kind of question.

MS. KERNS: Lynn and Savannah, Adam Kenyon does have his hand up if you need to phone a friend for some help with these, Savannah.

MS. LEWIS: Thank you, Toni, I really appreciate that. Hopefully my voice will hold out. Again, I apologize, I've got a summer cold going on. Pat, I'll get to your question. We don't calculate discard rates within the report, but we do have discard rates from the Observer Program that you've seen in the shrimp trawl estimates. It is in the report, and they range from 7 to 8 percent annually, according to the 2010 assessment.

MR. GEER: Okay, thanks, Savannah. Hope you feel better.

MS. LEWIS: Thanks, if you have more questions, we can always chat later after, when I hopefully have a voice.

CHAIR FEGLEY: I was just going to say, if you wanted to go to Adam and give your voice a rest, but if you've got Marty's question covered, go for it.

MS. LEWIS: I do, and I believe I covered. You might have to remind me, if I remember. But the demarcation for the northern region versus the southern region is actually the Carolinas, North Carolina and South Carolina. Then what was your second question, Marty? I apologize.

MR. GARY: Yes, it was just, and maybe it's not the right time for this question, but has there been any discussion. Looking at those landings in the northern region, it looks like they have a pretty significant increase over time. I was just wondering; this is a species that there may be some range expansion going on with it related to climate change. Again, maybe that's a question for a different scenario.

MS. LEWIS: Yes, that's an excellent question, Marty. Currently we're working through the stock assessment, so that might provide some more information. We'll hear from Jeff next. But I definitely think it's an important thing to keep in mind as a consideration for more than just the red drum.

MR. GARY: Okay thank you, and thank you for a great presentation. I'm sorry to test your voice.

MS. LEWIS: That's all right, thanks, Marty.

CHAIR FEGLEY: Thanks for that, Savannah, moving on to Roy Miller.

MR. ROY W. MILLER: A quick question, Savannah, if I may, and perhaps Lynn would know it, if you don't off the top of your head. Under the *de minimis* definition for Atlantic croaker, New Jersey and Delaware, if approved, would be exempt from the 30 fish creel limit. Am I right in that? I guess the same question applies to spot while we're on the topic of *de minimis*.

MS. LEWIS: Hey Roy, I can answer that one. That is correct. Currently under Addendum III, when the TLA is triggered at 30 percent, states that have been granted *de minimis* are not required to implement the management measures. However, if the TLA does trip at 60 percent, then all states are required to implement measures, including *de minimis* states.

CHAIR FEGLEY: Yes, that is the difference, is that as long as we're at that moderate concern, the *de minimis* states don't move. But if we get into that 60 percent area, then yes, everybody is on the hook, no pun intended. Any more questions?

MS. KERNS: Chris Batsavage.

CHAIR FEGLEY: Go ahead, Chris.

MR. CHRIS BATSAVAGE: Thank you, Savannah for the presentation. I have a question on research recommendations for croaker. First to Marty's point, with the increased landings in the northern region in 2020. I think part of that might have been the result of the strong 2018-year class that worked its way into the slot limit in 2020.

However, with the trend over the last few years, with some stronger year classes, climate change might be playing a role in that. I guess you had the simulation model for the assessment, and the assessment after that may shed some light on that. Regarding research recommendations for croaker, has the Technical Committee talked about the possibility of natural mortality changing for croaker over time?

Thinking about, you know we've seen some good juvenile abundance indices for croaker over the last several years, but the adult indices are staying really low, and landings are at their lowest level. I didn't know if that was something that the TC has talked about in any meetings, or is that something that might be explored for the next stock assessment?

MS. LEWIS: Hey Chris that is a great question. It is something up to this point at least, since I have been with the Commission, that we have not discussed looking into. I think it's an important area of something that the TC should probably start thinking about as well. That's kind of one of the recommendations from the PRT, and why they wanted to look into climate impacts, perhaps on the range of the species, for why we're seeing some significant shift. It's something that I think we will be looking into in the future.

CHAIR FEGLEY: Yes, that was a good question, Chris, and just to follow up on that a little bit. When is the next crack at an assessment for spot and croaker, if you could remind the Board that would be great?

MS. LEWIS: Let me pull that up, because the date did change last year. Jeff and Kristen, if you know off the top of your heads, feel free to chime in.

MR. KIPP: Yes, Savannah, this is Jeff, I could chime in. It's 2024 for both spot and croaker.

CHAIR FEGLEY: Okay, that's excellent, thank you. Okay, any other questions?

MS. KERNS: I don't see any hands, Lynn.

CHAIR FEGLEY: Okay, all right, well thank you, Savannah for that. I think we need action on this,

and I think what I would like to do is split this in two. Savannah, do you have a presentation on the implementation plan for Florida? Do you want to tackle the FMP Review compliance first, and then move on to Florida?

MS. LEWIS: Yes, let's do that first, and then we'll hop to Florida.

CHAIR FEGLEY: Okay, so I'll be looking for a motion if somebody has it, to approve the fishery management plan reviews for croaker and drum, and the state compliance, as well as the request for *de minimis*. If I've got a commissioner out there who would be willing to make that motion, it would be greatly appreciated.

MS. KERNS: I've got Joe Cimino.

CHAIR FEGLEY: All right, Joe Cimino, go ahead.

MR. JOE CIMINO: There is a double dipper in the *de minimis* world here. Let's see if I can do this. Well, we'll do it one species at a time, looks like. **Move to approve the Atlantic Croaker FMP review for the 2020 fishing year and state compliance reports, and *de minimis* status requests for New Jersey, Delaware, South Carolina and Georgia.**

CHAIR FEGLEY: All right, is there a second?

MS. KERNS: I have Mel Bell.

CHAIR FEGLEY: Excellent, thank you, Mel, for that. Okay, and I'll just ask really quick, does anybody want to discuss this motion? If you want to discuss this motion, raise your hand.

MS. KERNS: I have no hands.

CHAIR FEGLEY: All right, seeing none, I'm going to read it into the record. We're going to move to approve the Atlantic croaker FMP review for the 2020 fishing year, state compliance reports, and *de minimis* status request from New Jersey, Delaware, South Carolina and Georgia. Motion by Mr. Cimino, second by Mr. Bell. Is there any opposition to this motion? If you oppose, please raise your hand.

MS. KERNS: There are no hands, Lynn.

CHAIR FEGLEY: Excellent, so there we can cross croaker off the list. Let's move on to red drum. Joe, do you have a motion for that one as well?

MS. TINA L. BERGER: Hey Lynn, just a formality, you need to say that motion was approved.

CHAIR FEGLEY: Ah yes, thank you, Tina**. The motion on croaker to approve the compliance reports, FMP review, state compliance and *de minimis* request for croaker was approved by unanimous consent. Moving on, we have a motion that is the same for red drum, and who is our motion maker on this one?**

MS. KERNS: I've got Joe again.

CHAIR FEGLEY: Excellent, and do we have a second?

MS. KERNS: Mel Bell again.

CHAIR FEGLEY: Okay, and I'll just ask for the record if there is anybody who cares to discuss this. If you do, raise your hand.

MS. KERNS: I see no opposition.

CHAIR FEGLEY: Okay, so we are going to move to approve the Red Drum FMP Review for the 2020 fishing year, state compliance reports, and *de minimis* status for New Jersey and Delaware. Motion by Mr. Cimino, second by Mr. Bell. If there is any opposition, please raise your hand.

MS. KERNS: No opposition.

CHAIR FEGLEY: **Thanks, the motion is approved by consent.** With that, I think that leads us to move along to Florida has submitted an Implementation Plan for its commercial Atlantic croaker fishery, so

we're going to hear a little bit about that, and then take action on that. Savannah, back to you.

CONSIDER STATE IMPLEMENTATION PLAN FROM FLORIDA FOR ITS COMMERCIAL ATLANTIC CROAKER FISHERY

MS. LEWIS: I'll just review. Florida has qualified for de minims historically for their commercial Atlantic croaker fishery. However, they no longer qualify for *de minimis*, and so trying to get ahead of it, they did submit a state implementation plan, so that they are in compliance with Addendum III, once that *de minimis* status falls off after 2021.

The Technical Committee did meet to review it, and found it to be technically sound, and recommended approval. It follows the same methodology as was done for their spot commercial fishery. They would like to do a commercial vessel limit of 1,200 pounds in state waters, and this is projected to reduce the 10-year average by 1.06 percent, so it meets the criteria. Today we just need to vote on whether to approve or disapprove the State Implementation Plan for Florida.

CHAIR FEGLEY: Thank you, Savannah, does anybody have any questions for Savannah, or for the Florida delegation about this plan?

MS. KERNS: Two questions, Pat Geer and Chris Batsavage.

MR. GEER: No, I was just going to make a motion. I can wait until Chris asks his question.

CHAIR FEGLEY: Excellent, Chris, do you have a question, or were you also going to make a motion?

MR. BATSAVAGE: I have a question, Madam Chair. I can't remember from the memo in the briefing material, but if this is approved, when does Florida expect to implement these management measures?

MS. LEWIS: I can answer that for you, or Erika has her hand up, I will let her speak for Florida.

CHAIR FEGLEY: Go ahead, Erika.

MS. ERIKA BURGESS: Savannah, thank you for presenting this today. Chris, our plan is to bring it forward to our Commission in October, and so it will go into effect, likely around December of 2021, so we'll have these rules take effect within the 2021 calendar year, and I'm happy to answer other questions that you may have.

CHAIR FEGLEY: Okay, thank you, Erika. Are there any other questions for Erika or for staff?

MS. KERNS: I have no other hands, Madam Chair.

CHAIR FEGLEY: Great, so Pat Geer, I believe that you are up.

MR. GEER: Move to approve the Atlantic croaker state implementation plan for Florida.

MS. KERNS: Second by Spud Woodward.

CHAIR FEGLEY: Thank you, Spud. Okay, so I'm going to read this into the record, and then just immediately call the question. This is a motion to approve the Atlantic croaker state implementation plan from Florida, motion by Mr. Geer, second by Mr. Woodward. Is there any opposition? If so, please raise your hand.

MS. KERNS: I have no hands raised in opposition.

CHAIR FEGLEY: **Excellent, so this is approved by unanimous consent, and I thank everyone for that.** I really thank you too, staff, for your excellent presentations and work, and getting us through these agenda items so efficiently.

UPDATE ON THE RED DRUM MODELING PROCESS AND THE 2022 SIMULATION STOCK ASSESSMENT

CHAIR FEGLEY: With that we'll move on to the next one, which is to get an Update on the Red Drum Modeling Process and the 2022 Simulation Stock Assessment from Jeff Kipp. I'm personally really looking forward to seeing the results of this project.

I think it's pretty creative and pretty exciting. Go ahead, Jeff.

MR. KIPP: Thank you, Madam Chair. Just as a reminder, the objective of this simulation assessment we're working on now, is to evaluate the performance of candidate assessment approaches, to guide future benchmark assessments of red drum, including the next benchmark assessment that is scheduled to start, following Board review of the simulation assessment and peer review. This subsequent benchmark assessment is scheduled to be finalized and peer reviewed through the SEDAR process in 2024.

Just to address Marty Gary's earlier question on potential range expansion of red drum. Those types of questions are more likely to be tackled during this subsequent benchmark assessment, when we'll be shifting focus from these simulated datasets that we're working with now, to the observed datasets that are collected through the monitoring programs, and grappling with standard terms of references, like stock structure, that come on in traditional stock assessments. I just thought I would throw that in there to address that question.

But since my last update to the Board at the meeting in March of this year, the Stock Assessment Subcommittee has continued meeting biweekly to review progress, and provide feedback, mostly on generating estimates from our three candidate assessment approaches we're evaluating here. Those are the statistical catch at age model that's been used in previous red drum assessments.

A stock synthesis integrated model that uses both length-structured in and age-structured data, and then also a traffic light analysis, which we've been discussing quite a bit here today. This work has been progressing well, and we're planning some initial review of performance of these three assessment methods during our next progress call, which is Wednesday, next week. We have also scheduled our last workshop of this process. That was scheduled for October 4 through 7, and to be determined yet whether it will be in-person or virtual, like most of our other meetings, or all of our other meetings have been for this assessment process. But during that assessment workshop, we'll be working to wrap up most of the review of the performance results for each of these three assessment approaches, and to make some recommendations on assessment methods for red drum moving forward, to again guide some of these future benchmark assessments for red drum.

We anticipate having the simulation assessment peer reviewed in March of 2022, and presented to the Board at the spring meeting in May of 2022. I also just wanted to take this opportunity to thank Thom Teears, who was previously with North Carolina DMF. Tom was a Stock Assessment Subcommittee member that accepted a new position in New Caledonia.

But he was instrumental in getting the TLA or evaluating, developed before he moved on, which was a big endeavor, basically developing a TLA from scratch for red drum, which we hadn't done previously. That concludes my update, and I can take any questions on the simulation assessment.

CHAIR FEGLEY: Great, thank you, Jeff. Are there any questions from the Board?

MS. KERNS: I don't see any hands, Lynn.

MS. KERNS: I guess I should say that everybody's presentations have been so thorough that the Board has no questions, not that they've necessarily stumped them.

CHAIR FEGLEY: Well, yes, and thank you again, Jeff, and to everyone for the C for crystal clear presentations.

ELECT VICE-CHAIR

CHAIR FEGLEY: I think though, before we adjourn, we have one other order of business, which is to nominate and elect a Vice-chair, and I'm looking for somebody who may have a motion on this.

MS. KERNS: I have John Clark.

CHAIR FEGLEY: Thank you, John Clark, go ahead.

MR. JOHN CLARK: I'm honored to nominate for Vice-chair, our esteemed colleague from the tar heel state, Mr. Chris Batsavage.

CHAIR FEGLEY: Excellent, and I guess, is that the motion? Do we need a second for that, or do I ask, yes, do I have a second for this motion?

MS. KERNS: Pat Geer.

CHAIR FEGLEY: Very good, and I'm sure there is no need to discuss this, so I'll call the question. It is a motion to nominate Chris Batsavage as Vice-chair of the Sciaenids Management Board, motion by Mr. Clark, second by Pat Geer. Is there any opposition to this motion?

MS. KERNS: I have no hands.

CHAIR FEGLEY: **All right, seeing none, congratulations,** Chris, that's excellent.

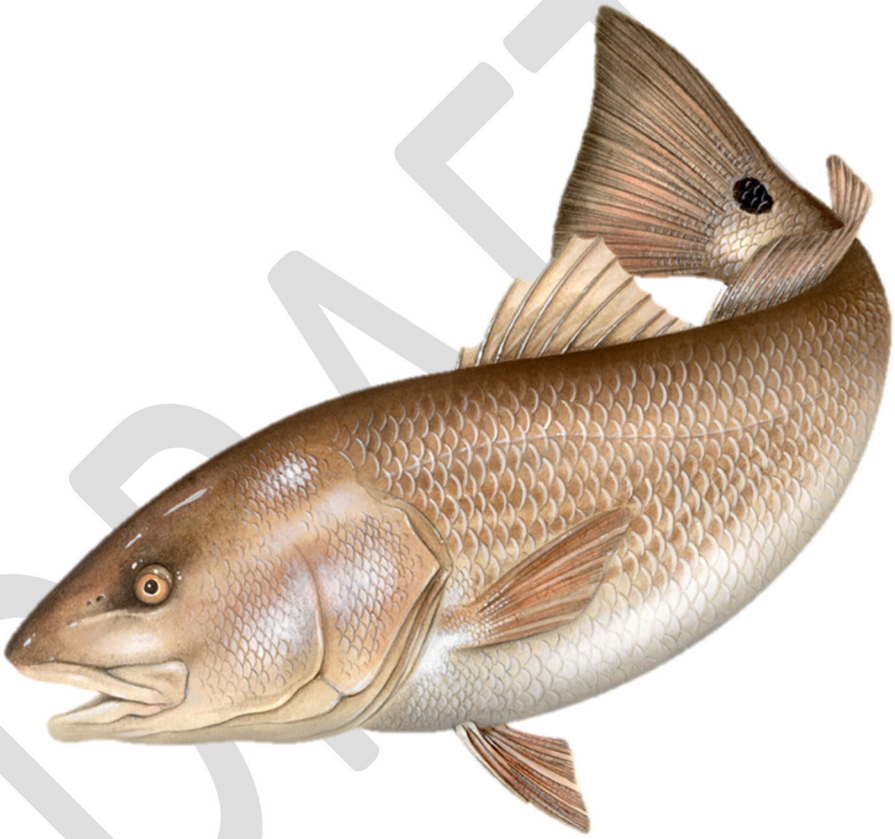
ADJOURNMENT

CHAIR FEGLEY: All right, well with that it looks like we're going to get about 45 minutes of our afternoon back, and I want to thank everybody for your attention. I really want to thank staff and our TC representatives for all of their work, and I'm going to take my prerogative as Chair to call this meeting adjourned, and wish you all an excellent evening.

(Whereupon the meeting adjourned at 4:30 p.m. on Tuesday, August 3, 2021)

Atlantic States Marine Fisheries Commission

2022 Red Drum Simulation Stock Assessment Report



Draft for Peer Review

Vision: Sustainably Managing Atlantic Coastal Fisheries

Atlantic States Marine Fisheries Commission

2022 Red Drum Simulation Stock Assessment

Prepared by the
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A publication of the Atlantic States Marine Fisheries Commission pursuant to National Oceanic and Atmospheric Administration Award No. _____

ACKNOWLEDGEMENTS

The Atlantic States Marine Fisheries Commission (ASMFC) thanks all of the individuals who contributed to the development of the 2022 Red Drum Simulation Stock Assessment. The ASMFC specifically thanks members of the Red Drum Technical Committee (TC) and Red Drum Stock Assessment Subcommittee (SAS) who developed the consensus stock assessment report and ASMFC staff, Jeff Kipp and Savannah Lewis, for coordinating the assessment and completion of the report.

The TC and SAS would also like to acknowledge the following individuals for their support during the assessment: Katie Drew (ASMFC) for providing technical support and analytical contributions, Mike Rinaldi (ACCSP) for validating and providing commercial landings data from partner agencies, Kelli Johnson (NOAA Fisheries) for providing guidance and technical support for the ss3sim simulation software used extensively during this assessment, Kathryn Doering (NOAA Fisheries) and Rick Methot (NOAA Fisheries) for guidance on Stock Synthesis modeling, and the ASMFC's Assessment Science Committee, particularly the subcommittee of Amy Schueller (NOAA Fisheries), Matt Cieri (ME DMR), and Alexei Sharov (MD DNR), for support developing a road map to future stock assessments of red drum.

EXECUTIVE SUMMARY

Red drum (*Sciaenops ocellatus*) are one of the most targeted recreational fish throughout the South Atlantic, with the majority of southern states reserving their harvest strictly for recreational anglers. Red drum have a unique life history that includes high vulnerability of young, immature fish to fishing mortality in heavily fished, inshore habitats and reduced vulnerability of older, mature fish that emigrate from these heavily fished habitats to offshore habitats. Current management practices (size slot limits) further reduce the habitat-induced reduction of mature fish vulnerability to harvest. This shift in vulnerability severely complicates stock assessment by causing considerable uncertainty disentangling mortality from emigration rates during the transition from inshore habitats to the spawning stock in offshore habitats. The reduced vulnerability impacts fishery-dependent and fishery-independent data collection, creating data limitations that have been addressed with influential assumptions in past stock assessment models. These limitations may have become more impactful as a poorly characterized component of stock removals, age composition of recreational discards, has become an increasingly larger portion of total stock removals. Estimates of the management quantity currently used to manage red drum fisheries, spawning potential ratio (SPR), are sensitive to these data limitations and assumptions. These limitations have also precluded estimates in past assessments of the reproductive capacity of the stocks (i.e., spawning stock biomass or total fecundity) considered reliable for management, leading to what has been termed a cryptic biomass.

There have been varying stock assessment models applied to red drum stocks through time with varying results and management advice. These stock assessment challenges led to the Atlantic States Marine Fisheries Commission's (ASMFC) Sciaenids Management Board (Board) tasking of the ASMFC's Assessment Science Committee (ASC) with providing a road map for future red drum stock assessments following the most recently completed stock assessment. The ASC formed a subcommittee that, with the Red Drum Stock Assessment Subcommittee (SAS), produced a road map recommending evaluating three potential assessment frameworks through the use of simulation analyses.

Simulation models would be used to simulate red drum stocks, with known population dynamics, subjected to various fishing mortality scenarios, with the simulated stocks subsequently being sampled for data mimicking available data streams for stock assessment of *in situ* (actual, true) red drum stocks. Data streams would then be applied to the three potential frameworks to test their reliability in characterizing the known stock status of the simulated stocks. The results would be used to infer reliability of the candidate frameworks when applied to the *in situ* red drum stocks and to recommend the preferred framework(s) for providing management advice during subsequent stock assessments of the *in situ* stocks.

The recommended timeline for the current red drum assessment cycle is for a two-stage assessment process over a four year period, with a first stage devoted to the simulation analyses recommended in the road map (which this report covers) and a second stage devoted to a traditional benchmark stock assessment of *in situ* stocks.

Simulation models, or operating models (OMs), were constructed from available information on red drum stocks to simulate dynamics of red drum-like stocks through time and provide sampling data replicating data available from *in situ* stocks for stock assessment. Sampling data were then used by candidate assessment approaches, or estimation models (EMs), to predict the population dynamics of the simulated stocks.

Three assessment approaches were selected as candidate EMs based on their past use or consideration for red drum assessment and their suitability to the three assessment frameworks recommended in the road map for future red drum stock assessments. A red drum Traffic Light Analysis (TLA) was developed during this assessment and selected as a model-free stock indicator assessment framework. The statistical catch-at-age (SCA) models used for management advice in the most recent assessment were selected as an assessment framework intended to provide estimates primarily of the juvenile, sub-adult portion of the stocks. The models lump all ages older than age-6 into a plus group and do not estimate spawning stock biomass or a link between adults and productivity (i.e., no stock-recruit relationship). Integrated models developed in Stock Synthesis (SS) were selected as an assessment framework intended to estimate population dynamics of all life stages of the stocks. These models track all age classes in the stocks, estimate spawning stock biomass, and link adults to productivity through an estimated stock-recruit relationship.

Performance of these assessment approaches for estimating the population dynamics of the simulated stocks was evaluated using a suite of performance metrics calculated from eight population parameters identified as the highest priority parameters based on their importance to fishery managers (recruitment condition, SSB status, three-year average SPR ratios, three-year average SPR status, three-year average fishing mortality ratios, three-year average fishing mortality status, age-4 escapement, and age-6 escapement).

Performance was evaluated within and across several simulation scenarios with alternative population dynamics likely to be encountered in future red drum assessments. This scenario testing allows for a unique understanding of an EM's performance under potential structural differences between a true population being assessed and the EM that might be experienced in a benchmark stock assessment (i.e., misspecification) given the quantity and quality of data available. This type of scenario testing also allows for an evaluation of a respective EM's performance relative to other candidate EMs with their own structural differences that are being considered for stock assessment models.

For the simulated northern stock of red drum, the simulation analyses identified concerns with specific EMs, leading to recommendations on appropriate models for consideration during the upcoming benchmark stock assessment. In general, pursuing both the SS and TLA assessment approaches in the upcoming assessment is recommended for the northern stock of red drum; further pursuing the SCA model for the northern stock is not recommended. The SCA had two identified and concerning deficiencies detracting from its use as an assessment model for the northern stock, namely its sensitivity to data weighting choices and reliance on external fishing mortality information. Although the model estimated parameters with reasonable and even superior precision, this precision was driven by external fishing mortality inputs and often centered around the most biased performance of northern EMs. The SS model generally

performed as well or better than the other northern EMs in terms of accuracy. The TLA performed comparably to the SS EM in making spawning stock biomass status determinations, and generally outperforms SS when characterizing recruitment condition. However, use of the TLA is not recommended for fishing mortality status determinations in the northern stock due to its poor performance in terms of error rates when estimating this status.

For the simulated southern stock of red drum, the overall similar performance (in terms of bias and precision) of all three EM approaches leads to a recommendation that all should be pursued in the upcoming benchmark stock assessment. The SCA was more robust to data weighting choice and does require external fishing mortality information, as for the northern model. Relative to the southern SCA EM, the southern SS EM generally estimated with slightly greater precision, though the SCA EM estimated with greater accuracy. Similar to the northern stock, the investigation of the TLA suggests there is utility in continuing to develop it as a potential assessment methodology for red drum. The southern stock results indicate the TLA is useful for all metrics, including fishing mortality status which was deemed unreliable using the TLA for the northern stock.

These recommendations should guide workloads and preparation for the upcoming benchmark, though, ultimately, the preferred approach will depend upon fits to the observed data from *in situ* stocks available in the benchmark.

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TERMS OF REFERENCE

For the 2022 ASMFC Red Drum Simulation Stock Assessment

Board Approved August 2020

Terms of Reference for the Red Drum Simulation Assessment

1. Describe fishery-dependent and fishery-independent monitoring programs for red drum and the data sets produced from these monitoring programs for stock assessment. Characterize precision and accuracy of data sets.
    a. Provide descriptions of each monitoring program and data collected (e.g., geographic location, sampling methodology and changes through time).
    b. Describe calculation of data sets produced from these monitoring programs for stock assessment.
    c. Discuss trends in data sets and associated estimates of uncertainty (e.g., standard errors). Discuss potential explanation for outlying or anomalous data.
2. Describe available information for parameterizing simulation models (e.g., historical stock assessment estimates, life history and fishery characteristic studies, regulation changes). Characterize uncertainty of parameters.
3. Develop methods to project a simulated population through time. Implement sampling procedures in simulation models to generate data sets mirroring data sets available from existing monitoring programs.
4. Develop simulated populations that incorporates uncertainty in information used to parameterize the simulation models. Characterize uncertainty and limitations in simulation models and potential impacts on perceived understanding of in situ population dynamics and stock status.
5. Develop candidate assessment methods and apply assessment methods to data sets sampled from simulated populations.
6. Define reference points for characterizing stock status of simulated populations.
7. Identify performance metrics and evaluate performance of each candidate assessment method for estimating the population dynamics and stock status of simulated populations. Describe strengths and weaknesses of each assessment method.
8. Recommend the preferred assessment method(s) for characterizing stock status.
9. Provide prioritized recommendations on future monitoring to improve assessment.

1 INTRODUCTION

Red drum (*Sciaenops ocellatus*) are one of the most targeted recreational fish throughout the South Atlantic, with the majority of southern states reserving their harvest strictly for recreational anglers. Red drum are commonly found along the Atlantic coast from Florida through the Chesapeake Bay, though with very rare occurrences have been reported as far north as Maine. In their common range along the Atlantic Coast, red drum are divided into two regional management areas, or stocks, a northern stock from North Carolina through New Jersey, and a southern stock from South Carolina to Florida.

Red drum have a unique life history that includes high vulnerability of young, immature fish to fishing mortality in heavily fished, inshore habitats and reduced vulnerability of older, mature fish that emigrate from these heavily fished habitats to offshore habitats. Current management practices (size slot limits) further reduce the habitat-induced reduction of mature fish vulnerability to harvest. This shift in vulnerability severely complicates stock assessment by causing considerable uncertainty disentangling mortality from emigration rates during the transition from inshore habitats to the spawning stock in offshore habitats. The reduced vulnerability impacts fishery-dependent and fishery-independent data collection, creating data limitations that have been addressed with influential assumptions in past stock assessment models. These limitations may have become more impactful as a poorly characterized component of stock removals, age composition of recreational discards, has become an increasingly larger portion of total stock removals. Estimates of the management quantity currently used to manage red drum fisheries, spawning potential ratio (SPR), are sensitive to these data limitations and assumptions. These limitations have also precluded estimates in past assessments of the reproductive capacity of the stocks (i.e., spawning stock biomass or total fecundity) considered reliable for management, leading to what has been termed a cryptic biomass.

There have been varying stock assessment models applied to red drum stocks through time with varying results and management advice. There have also been uncertainties of these stock assessment models noted by past peer review panels. These stock assessment challenges led to the Atlantic States Marine Fisheries Commission's (ASMFC) Sciaenids Management Board (Board) tasking of the ASMFC's Assessment Science Committee (ASC) with providing a road map for future red drum stock assessments following the most recently completed stock assessment (ASMFC 2017b). The ASC formed a subcommittee to develop the road map and the subcommittee recommended the Red Drum Stock Assessment Subcommittee (SAS) be repopulated to assist with the road map.

The road map produced by the ASC and SAS recommended evaluating three potential frameworks to develop management advice from the next benchmark stock assessment (in no particular order):

1) model-free stock indicators, similar to traffic light analyses used for Atlantic croaker and spot
2) a population dynamics model tracking the juvenile components of the stocks, and
3) a population dynamics model tracking all life stages of the stocks.

The anticipated advantage of the first framework is being able to provide advice on all life stages with data currently available, with the most notable disadvantage being no quantitative stock status estimates. Rather, this framework would provide stock status as changes in individual data sets or indicators relative to some predefined time period in the available data. The anticipated advantage of the second framework is being able to provide estimates of stock status relative to potential productivity from integrated juvenile data (currently available), with the most notable disadvantage being stock status estimates that are not directly influenced by changes in the mature, adult components of the stocks (data currently limited or not available). The anticipated advantage of the third framework is being able to provide estimates of stock status relative to potential productivity from integrated data across life stages, but estimates from this framework are likely to have relatively high levels of uncertainty given current data limitations on adult components of the stocks (i.e., lack of age composition data characterizing dead discards). Further, the Board has expressed interest in being able to determine whether or not the stocks can be declared rebuilt or not, necessitating the estimation of the adult component of the stocks and encouraging the exploration of this third framework.

The road map recommended the use of simulation analyses as the basis for evaluating these potential frameworks. Simulation analysis has been used as a diagnostic of stock assessment model performance and reliability, providing a means of model validation and comparison across multiple candidate stock assessment models not possible with analyses of *in situ* (actual, true) stocks (Chen et al. 2005; Deroba et al. 2015). Simulation models would be used to simulate red drum stocks, with known population dynamics, subjected to various fishing mortality scenarios, with the simulated stocks subsequently being sampled for data mimicking available data streams for stock assessment of *in situ* stocks. Data streams would then be applied to the three potential frameworks to test their reliability in characterizing the known stock status of the simulated stocks. The results would be used to infer reliability of the candidate frameworks when applied to the *in situ* red drum stocks and to recommend the preferred framework(s) for providing management advice during subsequent stock assessments of the *in situ* stocks. Simulation testing was also recommended to identify the data deficiencies causing uncertainty in assessment advice to focus improvements in data collection efforts into the future. Results and findings of the simulation analyses could then be immediately and directly incorporated into a subsequent benchmark stock assessment of the two red drum stocks along the Atlantic coast for the development of management advice.

The recommended timeline is for a two-stage assessment process over a four year period, with a first stage devoted to a simulation analysis (which this report covers) and a second stage devoted to a traditional benchmark stock assessment of *in situ* stocks. The Board agreed with the recommendations in the roadmap at the ASMFC 2020 Winter Meeting and initiated the development of this assessment.

1.1 Management Unit Definition

The management unit is defined as the red drum resource throughout the range of the species within U.S. Atlantic coast waters of the estuaries eastward to the offshore boundaries of the Exclusive Economic Zone (EEZ) from Florida through New Jersey. The ASMFC manages red drum

under the authority of the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA). The selection of this management unit is based on the biological distribution of the species along the Atlantic coast and historical harvest patterns which have identified fisheries for red drum. The management unit is divided into a southern region and a northern region. The southern region includes the waters of the Atlantic coast of Florida north to the North Carolina/South Carolina border. The northern region extends from the North Carolina/South Carolina border north through New Jersey.

1.2 Regulatory and Management History

The ASMFC adopted a Fishery Management Plan (FMP) for red drum in 1984 (ASMFC 1984) with an original management unit of the states from Florida to Maryland. The plan was designed to address recreational-commercial conflicts and lack of data needed to define optimum yield (OY). At this time, the ASMFC managed red drum in tandem with the South Atlantic Fishery Management Council (Council). The Council managed red drum in federal waters whereas the ASMFC managed state waters. The plan adopted the following objectives:

1) Attain, over time, optimum yield.
2) Maintain a spawning stock sufficient to minimize the possibility of recruitment failure.
3) Promote the cooperative interstate collection of economic, social, and biological data required to effectively monitor and assess management efforts relative to the overall goal.
4) Promote cooperative interstate research that improves understanding of the biology and fisheries of red drum.
5) Promote harmonious use of the resource among various components of the fishery through the coordination of management efforts among the various political entities having jurisdiction over the red drum resource.
6) Promote determination and adoption of the highest possible standards of environmental quality and habitat protection necessary for the natural production of red drum.

In 1990, the Council adopted a similar FMP for red drum that defined overfishing and OY consistent with the Magnuson-Stevens Fishery Conservation and Management Act of 1976. Adoption of this plan prohibited harvest of red drum in the EEZ, a moratorium which still remains in effect today. Recognizing all harvest would take place in state waters, the Council FMP recommended states implement measures to constrain harvest.

Following this request, ASMFC initiated Amendment 1 in 1991 in incorporate the goal to attain OY from the fishery over time. OY was defined as the amount of harvest that could be taken while maintaining the level of spawning stock biomass per recruit (SSBR) at or above 30% of the level which would result if fishing mortality was zero (i.e., spawning potential ratio, or SPR, of 30%). However, a lack of information on adult stock status resulted in the use of a 30% escapement rate of sub-adult red drum to the offshore adult spawning stock.

Substantial reductions in fishing mortality were necessary to achieve the escapement rate; however, the lack of data on the status of adult red drum along the Atlantic coast led to the adoption of a phase-in approach with a 10% SPR goal. In 1991, states implemented or maintained harvest controls necessary to attain the goal.

Amendment 1 to the Council's FMP updated MSY to 30% SPR, OY to 40% SPR, overfishing at less than 30% SPR, and an overfishing threshold as 10% SPR (ASMFC 2002). Amendment 2 to the Council FMP identified, described and recommended measures to protect Essential Fish Habitat (EFH) and EFH Habitat Areas of Particular Concern for red drum as part of the Council's comprehensive habitat amendment (SAFMC 1998b).

In 1999, the Council recommended that management authority for red drum be transferred to the states under the ACFCMA. This was recommended, in part, due to the inability to accurately determine an overfished status, and therefore stock rebuilding targets and schedules, as required under the revised Sustainable Fisheries Act of 1996. The transfer necessitated the development of an amendment to the ASMFC FMP in order to include the provisions of the ACFCMA.

The subsequent amendment, Amendment 2 to the ASMFC FMP, moved management authority of red drum from the Council to the states in June 2002 (ASMFC 2002) and serves as the current management plan. The final rule that ultimately repealed the Council's FMP and transferred management authority of Atlantic red drum in the EEZ from the Council to the ASMFC became effective November 5, 2008. The Amendment required states to implement recreational creel and size limits to achieve the fishing mortality target, including a maximum size limit of 27 inches total length (TL), and maintain existing commercial regulations. A harvest moratorium and Presidential Executive Order, enacted in 2007, prevents any harvest or sale of red drum from federal waters. The goal of Amendment 2 is to achieve and maintain the OY for the Atlantic coast red drum fishery as the amount of harvest that can be taken by U.S. fishermen while maintaining the SPR at or above 40%. There are four plan objectives:

1) Achieve and maintain an escapement rate sufficient to prevent recruitment failure and achieve an SPR at or above 40%.
2) Provide a flexible management system to address incompatibility and inconsistency among state and federal regulations which minimizes regulatory delay while retaining substantial ASMFC, Council, and public input into management decisions; and which can adapt to changes in resource abundance, new scientific information, and changes in fishing patterns among user groups or by area.
3) Promote cooperative collection of biological, economic, and sociological data required to effectively monitor and assess the status of the red drum resource and evaluate management efforts.
4) Restore the age and size structure of the Atlantic coast red drum population.

The SPR of 40% is considered a target; an SPR below 30% (threshold level) results in an overfishing determination for red drum. All states were in compliance by January 1, 2003.

The Board approved Addendum I to Amendment 2 in August 2013. The Addendum sought to increase the knowledge base and aid in the protection of important red drum habitat. It updated Amendment 2's habitat section to include more up to date information on red drum spawning habitat and habitat by life stage (egg, larval, juvenile, sub-adult, and adult). The addendum also identified and described the distribution of key habitats of concern, including threats, habitat bottlenecks, and ecosystem considerations.

Red drum regulations through time are provided in Table 1 (northern stock) and Table 2 (southern stock).

1.3 Assessment History

There have been eight previous regional assessments for red drum inhabiting Atlantic coast waters of the U.S. (Vaughan and Helser 1990; Vaughan 1992; Vaughan 1993; Vaughan 1996; Vaughan and Carmichael 2000; SEDAR 2009a; SEDAR 2015a; ASMFC 2017b). There have also been several state-specific assessments conducted in Florida, South Carolina, and North Carolina.

1.3.1 Regional Stock Assessments

Early regional stock assessments (through Vaughan 1993) analyzed red drum as one coastwide stock and were primarily based on analysis of catch age composition data with catch curves and virtual population analyses (VPAs) of only young red drum (ages 0-5 – see note on age convention in next paragraph). These early assessments were designed to remove the effect of emigration on the apparent decline (mortality) in catches of red drum as they moved from heavily fished inshore sub-adult habitats to more lightly fished offshore adult habitats. For the most part, the condition of the stock was inferred from the calculated level of escapement through age-5, though SPR (reported in these assessments as maximum spawning potential or MSP) was also calculated as a management benchmark despite little information on adult catches. These assessments generally estimated high mortality and low escapement and MSP throughout the 1980s and into the early 1990s.

Beginning with Vaughan (1996), the assessment separated the coastwide population into the two stock definitions currently used in assessments. Major concerns beginning in this assessment were increasing numbers of live releases (and resultant dead discards) in the highly regulated recreational fisheries and the effects of minimum/maximum size restrictions complicating estimation of selectivity. The assessment introduced the use of VPA with indices of abundance included as inputs (calibrated VPA). It should be noted there was a change in the definition of the age designation after Vaughan (1996). The first calendar-year age in these early assessments was designated age-0 (January-December for biologically 4-16 month old fish). This was redefined as age-1 (given the convention of incrementing age on January 1) in more recent assessments. Also, given the difficulties estimating the decline in vulnerability associated with the sub-adult transition to offshore waters, a series of predefined linkages between age-specific selectivities were used to constrain the analyses. This assessment estimated high mortality and low MSP (<15%) continuing into the mid-1990s.

An assessment in 2000 by Vaughan and Carmichael used two VPAs (SVPA and FADAPT) and a spreadsheet-implemented, forward projecting statistical catch-at-age analysis. Uncertainty in the age structure of live-released mortalities was investigated by manipulating the lengths of red drum measured from angler creels. A range of release mortalities and selectivity linkage constraints were utilized in all analyses. The FADAPT VPA was selected as the preferred analysis for estimates of fishing mortality and SPR. In the northern stock, estimates of SPR increased from about 1.3% for the period 1987-1991 to approximately 18% for the period 1992-1998. For the southern stock, estimates of SPR increased from about 0.5% for the period 1988-1991 to approximately 15% for the period 1992-1998. These estimates indicated overfishing was occurring in both stocks.

The first SouthEast Data, Assessment, and Review (SEDAR) process for red drum, SEDAR 18, concluded in 2009 with data through 2007 (SEDAR 2009a). This assessment transitioned to new forward projecting statistical catch-at-age (SCA) models developed in AD Model Builder (ADMB). These SCA models relax assumptions required by the precursor VPA analyses that assume catch age composition data are observed without error, and were seen as advancements in models due to some data limitations in constructing the age composition data. The models included several unique aspects due to data availability and red drum life history including the constraint of estimating selectivity of ages-4 and 5+ as proportions of age-3 selectivity, grouping all ages older than age-6 into a plus group, and using fishing mortality and selectivity information from an external tagging analysis in the modeling procedures (northern stock only). The models used fishery catch and age compositions, indices of abundance, and life history information (growth, maturity, and natural mortality). Like the VPAs, these models produced fishing mortality estimates that could be used to calculate SPR for comparison to reference points and status determination.

In the northern stock, SPR estimates increased from lows less than 10% in the beginning of the time series to values above the target (40%) by the mid-1990s. SPR was estimated to have varied at these higher levels above the threshold and often above the target for the remainder of the time series. In the southern stock, SPR was estimated to have been at the highest levels in the early 1990s then declined slowly, but remained above the threshold and target throughout the rest of the time series. The assessment provided a three-year average SPR over the last three years of the assessment time period (2005-2007) for stock status determinations to address uncertainty with annual estimates. Both stocks were determined not to be experiencing overfishing. Due to data limitations and poor estimates of the adult components of the stocks, the assessment could not make a determination of spawning population status (i.e., overfished vs. not overfished).

This assessment was accepted by a peer review panel, but peer reviewers noted several limitations and concerns with the SCA models that should be addressed in future assessments. The northern model was sensitive to inclusion of the external tagging analysis estimates used as inputs in the base model configuration and results were ultimately conditional on these inputs. Without these inputs, results were very different and indicated conflict between these inputs and the other more traditional data inputs (catch age composition, indices of abundance). Further, the reviewers noted unusually high fishing mortality estimates from the external tagging analysis early in the time series. The peer review panel recommended direct inclusion

of the tag-recapture data as model inputs in future assessments as opposed to externally-derived population parameter estimates.

Peer reviewers also expressed concern with uncertainty of model estimates, particularly for the southern stock. Confidence intervals were large and results were highly sensitive to selectivity estimates, allowing for only general, qualitative statements about the stock conditions. Reviewers noted highly uncertain and unrealistically large initial abundance estimate for older fish in the southern and northern models, respectively. These issues were explored during the review workshop, but remained after not arriving at solutions. Poor fits to catch age composition data resulted in age-specific patterning in residuals and the model time series was ultimately shortened during the review to exclude sparse composition data prior to 1989. The assessment team and review panel ultimately agreed that model structure was a major source of uncertainty in the assessment.

During a second SEDAR process in 2015 (SEDAR 44; SEDAR 2015a), an attempt was made to transition to integrated assessment models developed with the Stock Synthesis (SS) integrated analysis framework (Methot and Wetzel 2013). This transition was in response to some of the limitations of the SCA models and recommendations by the SEDAR 18 peer review panel. SS is an age- and size-structured assessment model in the integrated analysis class of models. It has 1) a population sub-model that simulates growth, maturity, fecundity, recruitment, movement, and mortality processes, 2) an observation sub-model which predicts values for the input data, 3) a statistical sub-model which characterizes goodness of fit and obtains best-fitting parameters and their associated variance, and 4) a forecast sub-model which projects various user-determined management quantities (Methot et al. 2020). SS allows for observed tag-recapture data and both length and age length key data as inputs, reducing data processing external to the model and better propagating uncertainty in model results. SS is also more flexible for modeling time series with varying data availability and the framework was anticipated to better utilize sparse data during the period of high exploitation prior to the 1989 start year in SEDAR 18.

Several challenges were experienced during model development resulting in poor model stability and no preferred model in time for the peer review workshop, so the objective of the workshop was changed from evaluating final model results for management advice to evaluating current model configurations and making recommendations to improve these configurations. Recommendations were addressed by the assessment team following the workshop and final model results were reviewed during a subsequent peer review. The SPR estimates were quite different from SEDAR 18, indicating the stocks had been experiencing overfishing throughout the time series. The 2011-2013 three-year average SPR was estimated to be 9.2% in the northern stock and 17% in the southern stock, both below the SPR threshold.

The assessment was accepted by the peer reviewers, but notable concerns were identified including sensitivity of the northern model stock status determination to treatment of the tag-recapture data. Ultimately, the models were not accepted by the South Atlantic State/Federal Fisheries Management Board (predecessor of the Sciaenids Management Board) due to concerns with the reliability of population parameter estimates. Instead, the Board tasked the

TC and SAS with several tasks including to evaluate the utility of the SCA models used in SEDAR 18 for updated management advice.

The SAS updated the SCA models in an additional assessment (ASMFC 2017b) with recent data and explored several potential changes to these models, including data changes, but ultimately recommended models with minimal structural changes for management advice. The 2011-2013 three-year average SPR was estimated to be 43.8% in the northern stock and 53.5% in the southern stock, both above the SPR threshold and target, indicating that overfishing is not occurring. However, most of the issues that arose with the models during SEDAR 18 remained and were noted by the peer reviews of this assessment.

Peer reviewers noted that examination of the assessment results, as well as corroborating information from the fishery-independent indices, suggest that both the northern and southern stocks appear to be above their management thresholds. However, reviewers concluded that there is a high degree of uncertainty associated with these assessments due to the lack of good fishery-dependent and -independent data on the oldest and most fecund age classes, coupled with sensitivity to data weightings and initial conditions suggesting an overall scaling problem with both regions' assessments. The wide confidence intervals in the south and the unrealistic decline in abundance over the time series in the north suggest fundamental assessment and data issues. Given the life-history and pattern of exploitation, it is unclear how these issues can be easily resolved. Further work is needed given the critical dependency of overfishing status determination on the fishing mortality estimates for older fish, and the difficulties of estimating fishing mortality when population size is indeterminate; the assessment only gives a rough measure of stock status.

While there are no major signals to suggest the stocks are in trouble, it should be recognized that even small changes in the fishing mortality on age-5 and older fish could lead to rapid overfishing. Theoretically, the SPR analysis measures exploitation in an equilibrium context. By that measure, a small increase in fishing mortality on older fish would lead to an immediate determination of overfishing. In practice, the stock dynamics would depend on the true population size of older fish. Since population size is highly uncertain, and in the north equilibrium is highly improbable, any management changes should be carefully considered. More specifically, measures that might increase fishing mortality rates on older fish should be avoided until the estimates can be verified. Moreover, the assessment cannot provide information on the potential population limits for recruitment failure as scale of the most fecund portion of the population is uncertain.

It is also important to recognize that the same concerns that were identified with the SS model formulation underlie the application of SCA models to the stocks. Despite its nominally less complex analytical structure, the data conflicts and instability of estimates remain in SCA, as in SS formulations. These issues would likewise confound any age structured modeling approach. It suggests that the overall problem is one of data and the pattern of exploitation which informs model approaches, rather than the approach itself.

1.3.2 State Stock Assessments

Florida

The Florida Fish and Wildlife Conservation Commission (FL FWC) has conducted several assessments of red drum, with the most recent assessment utilizing data through 2019 (Addis 2020). This assessment was conducted to assess the status of red drum populations found in four different regions along the Atlantic and Gulf Coast of Florida. The two regions of the Atlantic coast were defined as the southeast region (SE), from Miami-Dade through Volusia counties, and the northeast region (NE), from Flagler through Nassau counties.

SS models were developed, run from 1989 to 2019, accounted for 41 ages (0-40+), and were fit to catch, CPUE indices, length composition, and size-at-age data. Fits to the datasets from a parametric bootstrap analysis were adequate for all regions as most base run estimated parameters and derived quantities were inside the central range of the estimates produced by the bootstrap analysis.

Overall fishing mortality rate estimates for red drum ages 1-5 have remained at fairly low levels since the late 1980s in all four regions. However, recent increases have been apparent in the NE from 2010-2019 and the SE from 2015- 2018. Current spawning stock biomass ($SSB_{current}$, mt) calculated as the geometric mean of the past three years, is estimated to be 17,163 in the NE, and 27,940 in the SE region. The fishing mortality resulting in an SPR of 35% ($F_{SPR35\%}$) was estimated to be 0.26 and 0.23 in the NE and SE regions, respectively. The spawning stock biomass (mt) when the population is at SPR of 35% ($SSB_{SPR35\%}$) was estimated to be 7,801 in the NE and 10,336 in the SE.

Ratios of $SSB_{current}/SSB_{SPR35\%}$ and $F_{current}/F_{SPR35\%}$ from the two assessment regions indicate that red drum are currently neither overfished nor undergoing overfishing in Florida. The $SSB_{current}/SSB_{SPR35\%}$ ratios for the past three years were 2.2 and 2.7 in the NE and SE regions, respectively. The $F_{current}/F_{SPR35\%}$ ratios were 0.5 and 0.8 in the NE and SE regions, respectively.

Estimates of current escapement rates (geometric mean of the last 3 years, 2017-2019) in the NE regions exceeded 40%. Although the SE region of Florida is exceeding the escapement rate management target in the terminal year (2019) of the assessment (55%), it does not meet the current escapement rate management target. Current escapement rates for 2017-2019 were 61% in the NE and 35% in the SE region.

South Carolina

Using data from September 1982 thru August 2016, the South Carolina Department of Natural Resources (SC DNR) conducted a stock assessment to assess the status of the red drum population found along coastal South Carolina (Murphy 2017). Data used included catch, effort, relative abundance, size/age composition, and tag-recapture data sets. The assessment investigated three different assessment frameworks, a SS model excluding tag-recapture data, a SS model including tag-recapture data, and a SCA model as employed during ASMFC 2017b, with each giving broadly similar results.

The assessment suggested the abundance of juvenile and sub-adult red drum along coastal South Carolina increased from low levels in the early- to mid-1980s in response to increasing

levels of recruitment in the early 1980s despite high levels of fishing. Abundance of adult red drum continued to remain low or decline until the mid-late 1980s when these abundant groups of sub-adults recruited to the adult population and the abundance of adults began to rise. Fishing mortality declined dramatically after hitting peak values during 1985-1988 and continued declining at a slow rate through the late 1990s. During this time, the red drum population responded with variable but slowly declining recruitment, and an increased abundance of sub-adults and adults. Fishing mortality then began to increase steadily after 2000 as the number of discarded red drum (and inevitable discard deaths) increased dramatically. Finally, recruitment declined rapidly after 2008 and abundance of sub-adults and adults followed suit after 2010. SPR increased from low levels in the 1980s to levels exceeding typical biological target levels during the 1990s and early to mid-2000s. Since 2008, SPR levels have fluctuated between about 20-40% before declining in the 2014 and 2015 fishing years to likely be below 20%, indicating the population was experiencing overfishing.

This assessment result prompted new state management regulations, which went into effect on July 1, 2018, reducing the recreational bag limit to 2 fish per person and establishing a 6 fish per day boat limit.

North Carolina (description modified from Vaughan 2009)

An assessment was conducted by the North Carolina Division of Marine Fisheries (NCDMF; Takade and Paramore 2007) and included data provided by the Virginia Marine Resources Commission (VMRC) to update the earlier assessment by Vaughan and Carmichael (2000) for the northern red drum stock.

The northern red drum stock was assessed using commercial, recreational, and fishery-independent data from 1986 to 2005. Results were broken into three regulatory periods with relatively uniform regulations (early: 1986-1991, mid: 1992-1998, and late: 1999-2005). A major assumption in this assessment was assigning an accurate length distribution to released fish from the recreational fishery. While several assumptions on the length distribution of recreational releases were calculated, the preferred matrix (Tagging) used length frequencies estimated from modeling of NCDMF tag returns. Late period age-3 selectivity was estimated to be 0.48 of fully selected fish (age-2), and was estimated from modeling of NCDMF tag returns. Two models from the Vaughan and Carmichael (2000) assessment were updated: the backward calculating FADAPT VPA and the forward calculating spreadsheet catch-at-age model.

Fishing mortality estimated from FADAPT ranged from 0.50 to 0.49, with escapement ranging from 40.6% to 41.0% and SPR ranging from 40.4% to 40.8%. The spreadsheet catch-at-age model fishing mortality estimates ranged from 0.66 to 0.63, with escapement estimated at 32.8% and SPR estimated at 32.3%. All estimated runs using the TAGGING matrix from both models were above the threshold of 30% SPR and the FADAPT estimates were above the target of 40% SPR. All runs showed improvements in escapement and SPR from the previous regulation period (1992-1998).

This assessment indicated that fishing mortality has decreased and escapement and SPR had increased for the red drum northern stock during the latest management period (1999-2005). The results from Vaughan and Carmichael (2000) indicated that overfishing was occurring, with

SPR values well below the threshold SPR. The updated model estimates in this assessment were all above 30% SPR and, therefore, indicated that overfishing was no longer occurring. It appears that the condition of the northern red drum stock had improved and that the more restrictive management measures implemented during the latest management period had aided in that improvement.

2 LIFE HISTORY

2.1 Stock Definitions

Red drum inhabit nearshore and estuarine waters of the U.S. Atlantic coast from Massachusetts to Florida and the Gulf of Mexico (GoM) from Florida to northern Mexico (Lux and Mahoney 1969; Mercer 1984). The current distribution of red drum in the Atlantic Ocean, as indicated by commercial and recreational landings, primarily extends from southern Florida to Chesapeake Bay, with infrequent, low recreational landings from Maryland through New Jersey. Previous stock assessments (Section 1.3.1) divided this distribution into a northern stock (North Carolina through New Jersey) and a southern stock (South Carolina, Georgia, and the eastern coast of Florida) based on differences identified in life history characteristics (maximum age, growth, and maturity) as well as movement information from tagging data. Seyoum et al.'s (2000) initial mitochondrial genetic work on red drum indicated a weak subdivision of red drum into GoM and Atlantic components with a genetic transition occurring around the southern Florida peninsula between Sarasota Bay and Mosquito Lagoon, supporting the separate management of these populations. Large-scale genetic analyses have been conducted on red drum in the GoM by Gold et al. (2001) and Gold and Turner (2002).

Based on mitochondrial and microsatellite data, estuaries within the GoM showed temporal, but not spatial stability in allele frequencies. Further analyses of spatial patterns indicated the variability was not able to be partitioned into discrete geographic subpopulations, instead showing a pattern of isolation by distance. The proposed model of population structure fits well with gene flow predicted by life history and due to their estuarine-dependent recruitment; a steppingstone model where gene flow primarily occurred among adjacent estuaries was described with geographic neighborhoods limited to 700-900 km.

Additionally, the degree of genetic divergence detected was similar between the two markers, indicating the occurrence of sex-biased gene flow, due to female mediated dispersal and/or male philopatry.

Only two published papers have addressed red drum population structure within the Atlantic (mitochondrial sequence data, Seyoum et al. 2000; microsatellite data, Chapman et al. 2002), both indicating little to no level of spatial structuring among estuaries. However, the Atlantic spatial scale of both projects were limited and likely confounded by low sample sizes.

Additionally, an estuarine-collapsed analysis indicated temporal heterogeneity in the SC evaluation and was interpreted as a potential temporal instability of the reproductive pool (Chapman et al. 2002). Chapman et al. (2002) estimated a variance effective population size (N_e) of Atlantic red drum using the temporal method of Waples (1989) which was an order of magnitude lower than estimates of female N_e in the GoM (Turner et al. 1999). However, due to

red drum overlapping generations, an estimate of N_e requires a modification based on age-specific life history information (Jorde and Ryman 1995). At that time, the only correction factor available for red drum was based on GoM fish (Turner et al. 1999); however the appropriateness of those data for Atlantic red drum is unlikely based on suspected age-structure differences resulting from differential commercial fishery impacts during the 1980s. Therefore, determination of age-specific survival and birth rates are needed to determine accurate estimates of N_e for Atlantic red drum.

More recently, the SCDNR has utilized genetic samples from adult red drum collected from the multi-state longline surveys and other sampling efforts to evaluate genetic structure from NC to FL (Cushman et al. 2014). Temporal genetic differentiation was tested for within each of six sampling sites from NC to FL and found to be insignificant. Spatial genetic differentiation was then tested between the six sampling sites during the spawning season and non-spawning season. Significant differentiation was detected between NC and all southern sample sites (SC-FL) during the spawning season, but not during the non-spawning season. This work suggests a genetic break does exist between NC and locations south of NC during spawning, but some mixing of adults does occur during the non-spawning season. This mixing is less of a concern based on current management of the defined stocks which largely protects these adult fish from harvest (i.e., no mixed stock harvest). Estimates of N_e also supported the greater abundance of the southern stock estimated in previous stock assessments.

Based on the previous red drum assessments, the genetics work conducted by the SCDNR, and no new data, the Atlantic red drum population will continue to be defined as two stocks, a Northern stock defined as North Carolina and north and a Southern stock defined as South Carolina and south, in this assessment.

2.2 Migration Patterns

Adult red drum make seasonal migrations along at least some parts of the Atlantic coast. In the spring, adults move north and inshore but offshore and south in the fall. Overall, adults tend to spend more time in coastal waters after reaching sexual maturity. However, they do continue to frequent inshore waters on a seasonal basis. In the Indian River Lagoon (IRL), Florida, limited seasonal migrations (Reyier et al. 2011) including some movement to coastal inlets in fall during the spawning season have been detected (Reyier et al. 2011). In Mosquito Lagoon (northern IRL), a portion of the adult population remain within the estuary where documented spawning occurs (Johnson and Funicelli 1991; Reyier et al. 2011).

Tagging information provided the best insight into the movement and migration of red drum along the Atlantic coast. Each state, from Florida to Virginia, has participated in some form of tagging program (Section 4.3). Volunteer angler programs are or have been active in each state in which trained volunteers participate by tagging fish and reporting tagged fish when recaptured. Other programs include agency staff tagging and cooperative projects with local commercial harvesters. Almost every program relies heavily on angler returns for recapture information.

Despite differences in state-to-state programs, there is evidence of adult red drum movement between Virginia and North Carolina. Data suggest red drum movement into Virginia waters

from North Carolina in late May. The fish appear to stay in the area until August through September before they ultimately move during fall months to North Carolina waters where the fish appear to overwinter. Movement of red drum tagged in North Carolina over 25 years is summarized in Bacheler et al 2009. The study, based on 6,173 tag returns for red drum of all sizes, found limited movement of red drum from North Carolina to adjacent states, although some adult red drum migrated seasonally to Virginia in the spring, returning the following fall. The study noted that the current stock split between North Carolina and South Carolina appeared to be an appropriate ecological division for the stock.

Programs in the southern states (Georgia, and South Carolina) provided evidence of limited movement as well. For example, of 1,780 fish tagged in Georgia, 85.3% were recaptured within state waters (11.0% were recaptured in South Carolina, and 3.7% were recaptured in Florida). In South Carolina, fish tagged in the SC DNR sub-adult tagging program were primarily recaptured within 30 miles (96.4%; SEDAR 2009b). An additional working document on movement distances by South Carolina red drum tags that were recaptured by recreational anglers (Arnott 2015b) indicated more than 95% of red drum were recaptured within 125 miles of their release location, even after 5 or more (up to 18) years at large. Of 12,754 tags with known recapture locations, 79 were recaptured from North Carolina, 12,657 from South Carolina, 13 from Georgia and 5 from Florida.

An interesting pattern of movement, or lack of movement, was observed from fish overwintering in the area of power plants. The most productive of these areas was the Elizabeth River Hot Ditch area, in Virginia. Rather than migrating out of the Chesapeake Bay during fall to North Carolina waters (considered the usual pattern for sub-adult red drum), fish in this area were observed over-wintering in bay tributaries in the area of power plants. The cycling of river water through the plants resulted in discharges of warmed water sufficient to maintain adjacent areas at temperatures generally suitable for the fish (as well as forage the fish could use - crabs, finger mullet, mummichogs, etc.). Similar patterns were also observed, to a lesser degree, at another nearby power plant (SEDAR 2009b).

The genetic work by SCDNR also suggests some movement of adult red drum between SC and NC during non-spawning seasons. However, these adult fish do appear to return to their respective stock during the spawning season.

Tagging studies indicate that late age-0 and 1 year-old red drum are common throughout the shallow portions of the estuaries and are particularly abundant along the shorelines of rivers and bays, in creeks, and over grass flats and shoals of the sounds. During the fall, those sub-adult fish inhabiting the rivers move to higher salinity areas such as the grass flats and shoals of the barrier islands and the front beaches. With the onset of winter temperatures, juveniles leave the shallow creeks for deeper water in the main channels of rivers (9–15 m) and return again to the shallows in the spring. Fish that reside near inlets and along the barrier islands during the summer are more likely to enter the surfzone in the fall.

By their second and third full year of growth, red drum are less common in rivers but are common along barrier islands, inhabiting the shallow water areas around the outer bars and shoals of the surf and in coastal inlets over inshore grass flats, creeks or bays. In the northern portion of the South Carolina coast, sub-adults use habitats of broad, gently sloping flats (up to

200 m or more in width). Along the southern part of the South Carolina coast, sub-adult red drum inhabit narrow (50 m or less), fairly level flats traversed by numerous small channels, typically 5–10 m wide by less than 2 m deep at low tide (ASMFC 2002).

2.3 Age and Growth

Otoliths are the primary ageing structure collected from red drum along the Atlantic coast. Otoliths produce clearly interpretable annual growth bands, and age estimates are precise (ASMFC 2008) and considered highly accurate. Age estimates from scales are only considered accurate through age-4 (ASMFC 2008). Age structures have been processed and read for age data by state agencies and academic institutions from Virginia through Florida. Additional detail on age processing and reading is available in SEDAR 2015a. The maximum ages observed to date are 62 in the northern stock and 41 in the southern stock.

Red drum growth has long been understood to not be described well with some of the traditional growth models like the von Bertalanffy growth function (Porch et al. 2002; Cadigan 2009). There are strong seasonal influences on growth as well as indications of changing growth rates over the age range of the stocks that result in poor fits with traditional growth functions. Alternative growth estimates are available (Porch et al. 2002; Cadigan 2009) as well as empirical estimates of length-at-age, but these options are not compatible with growth options in simulation model software used in this assessment.

In anticipation of needing to approximate red drum growth in simulation models, an alternative growth function that allows for changing the von Bertalanffy Brody growth coefficient parameters (*K*) across ages (Methot et al. 2020, age-specific K growth) was used to generate stock-specific growth patterns. The growth function includes the traditional von Bertalanffy growth parameters for asymptotic length (L_{inf}) and the Brody growth coefficient (*base K*), but also allows for multipliers of the *K* parameter at user-specified older ages giving flexibility to the growth curve. The *base K* parameter is used in growth calculations for the youngest age (age-1 here) and any subsequent ages until an age break point where a *K* multiplier is specified. At this age break point, the multiplier is applied to the *base K* and the product serves as the new *K* parameter for any subsequent ages unless another age break point is specified. If another age break point is specified, the associated *K* multiplier is applied to the *K* parameter and the product becomes the new *K* parameter. This repeats for any age break points across the age range. The number of *K* multipliers can range from one to one less than the number of ages in the age range. The parameterization of the von Bertalanffy growth function used here also includes a parameter for the length (L_{min}) at a user-specified minimum age (A_{min}) when fish begin to grow according to the growth function. In addition to the von Bertalanffy growth curve describing expected mean length-at-age, the simulation models use coefficients of variation (CVs) for size at the smallest sizes and the largest sizes in the growth function with interpolation of CVs between these sizes to describe variation in growth around the expected growth curve.

Available growth data were compiled within each stock (Table 3) and age-specific K growth curves were estimated. There is no readily available optimization routine for this growth function, including for the best fit age(s) for break point(s), so parameters were estimated by inspecting residuals of fits with the traditional von Bertalanffy growth function (Figure 1 and

Figure 2) and specifying age break points with associated *K* multipliers to improve residual patterns. Growth CV parameters were specified so that 95% confidence intervals captured most of the observed variation in growth.

Age-specific K growth parameters are in Table 4. Growth patterns include age break points with *K* multipliers for ages 2, 4, 6, 12, and 18 in the northern stock and 2, 7, 12, and 18 in the southern stock. These break points align well between stocks except the addition of a third break point for the northern stock before age-12. Final growth patterns are shown in Figure 3 and Figure 4. Some patterning in residuals remains (Figure 5 and Figure 6) mostly due to the seasonal patterning of growth in younger ages, but residuals are improved across the age range, particularly for the older ages.

2.4 Reproduction

Much of the reproductive data for red drum is based on histological data as well as observations using telemetry. Most of the hydroacoustic data seems to be supported by the histological data (Lowerre-Barbieri et al. 2008). Due to a limited amount of data from the Atlantic coastal region it was necessary to use both Gulf of Mexico and Atlantic coast data.

2.4.1 Spawning Seasonality

Spawning season on the Gulf and Atlantic coasts of Florida peaks between September and October (Murphy and Taylor 1990). The northern Gulf of Mexico appears to have a spawning season between mid-August to September. Along the coast of North Carolina spawning peaked between August and September based on GSI and hydroacoustic data (Ross et. al. 1995; Luczkovich et al. 1999). Along the Georgia coast, based on hydroacoustic data, red drum appear to congregate and spawn between August and mid-October (Lowerre-Barbieri et al. 2008).

2.4.2 Sexual Maturity

Previously published information on red drum maturity were available from North Carolina, South Carolina, the Florida Atlantic coast (Indian Lagoon) and Florida Gulf of Mexico coast. Interpolated lengths of 50% maturity for male red drum were 529 mm for Florida's Gulf coast and 511 mm for the Atlantic coast of Florida and were mature between ages 1 and 3 (Murphy and Taylor 1990). Fifty percent of females were mature between 825 mm and 900 mm and all females were mature at age-6 in Florida (Murphy and Taylor 1990). In North Carolina, females were mature at 4 years while males were mature at 3 years (Ross et. al. 1995). Fifty percent of males were mature between 1 and 2 years of age while females did not mature until 3 years old (Ross et. al. 1995). The size of 50% maturity for females in SC was 792 mm TL and 713 mm TL for males. The age of 50% maturity for females was 4.3 years (52 months), while for males it was determined to be 3.5 years (43 months; Wenner 2000). In South Carolina, all males were mature at 4 years and all females were mature at 5 years (Wenner 2000).

During the SEDAR 44 data workshop, additional analyses were performed using more recent data available from South Carolina (n = 5,540 fish; Arnott 2015a). Raw data from the North Carolina study of Ross et al. (1995) were also obtained (n = 728 fish) so that maturity could be statistically compared between North Carolina and South Carolina. In the analysis of Ross et al

(1995), developing fish were classified as immature, whereas a recent study by Brown-Peterson et al. (2011) which has been widely accepted as a standardized reproductive methodology, classifies developing fish as mature. All North Carolina and South Carolina fish were therefore reclassified according to Brown-Peterson et al. (2011).

The analyses found significant differences between North Carolina and South Carolina in relationships between both maturity-at-size and maturity-at-age, as well as significant differences between males and females. Results from the analyses are presented in Table 5 and Figure 7 through Figure 12. While SEDAR 18 assumed one maturity schedule for both stocks, based on results of this updated analysis, maturity-at-age was calculated separately for the northern and southern stocks in the most recent assessment (ASMFC 2017b).

Among the South Carolina fish, significant differences were also detected between time periods spanning 1984 through 2013. This apparent temporal effect may have been driven by data deficiency in some of the size, age or temporal categories. Also, most of the maturity assessments were made by gross (macroscopic) examination, so it was not possible to cross-check for consistent methodology across time. Therefore, temporal changes in maturity schedules were not considered any further.

2.4.3 Sex ratio

The sex ratio in North Carolina was 1:1 (349 males:373 females; Ross et al. 1995). In the northern Gulf of Mexico, the sex ratio for spawning adults was also 1:1 (Wilson and Nieland 1994).

2.4.4 Spawning Frequencies

Wilson and Nieland (1994) estimated spawning frequencies for Northern Gulf of Mexico red drum from between 2 and 4 days.

2.4.5 Spawning Location

Spawning most likely occurs in the nearshore areas adjacent to channels and passes and may also occur over nearshore continental shelves (Murphy and Taylor 1990; Lowerre-Barbieri et al. 2008). Spawning locations in South Carolina were also associated with passes and channels (Wenner 2000). More recent evidence suggests that, in addition to nearshore vicinity habitats, red drum also utilize high-salinity estuarine areas along the coast (Murphy and Taylor 1990; Johnson and Funicelli 1991; Nicholson and Jordan 1994; Woodward 1994; Luczkovich et al. 1999; Beckwith et al. 2006).

2.4.6 Batch Fecundity

Batch fecundity estimates vs. fork length (FL), gonad-free body weight, age in year, and eviscerated body weight were generated by Wilson and Nieland (1994) for red drum from the northern Gulf of Mexico from 1986 to 1992. The mean batch fecundity was 1.54 million ova. Fish ranged from 3-33 years of age, had a FL range of 697-1005 mm, and a batch fecundity range of 0.16-3.27 (ova x 10^6).

2.5 Natural Mortality

Age-structured models attempt to reconstruct the fish population and fishing mortality rates by age and year, where total instantaneous mortality rate (Z) is the sum of instantaneous rates of fishing (F) and natural (M) mortality. Unfortunately, M is typically one of the most difficult parameters to determine, despite an abundance of effort to develop empirical methods to estimate M. These empirical methods have led to the development of a host of both age-constant and age-varying approaches to estimate natural mortality external to assessments based on other life history parameters (e.g., maximum age, growth rate parameters, size-at-age, age-at-maturity, etc.).

2.5.1 Age-Constant M Approaches

Historically, most assessments assumed natural mortality was constant over age and years. Invariably, these age and time constant estimates of M were derived from a suite of life history analogies, with perhaps the most commonly assumed approaches being proposed by Alverson and Carney (1975), Pauly (1980), Hoenig (1983), Jensen (1996), and Hewitt and Hoenig (2005). Such an age-constant approach was investigated during the SEDAR 44 assessment of red drum (Table 6). Note that the Hoenig (1983) method provides an estimate of total mortality, Z. It is only when fishing mortality can be assumed small ($F \sim 0$) that this becomes an estimate of M; otherwise it is an upper bound on M. The version of the Hoenig (1983) equation shown in Table 6 was derived from fish species only. The "rule of thumb" method has a long history in fisheries science, but it is difficult to pin down its source. Hewitt and Hoenig (2005) are referenced, who compare this approach to that of Hoenig (1983). Finally, we investigated the newest approach (Then et al. 2015) herein as a method for the development of age-constant natural mortality. This approach represents the development of a more robust data set and a more thorough vetting of potential studies for inclusion than originally proposed by Hoenig (1983), including data from over 200 species representing a broader range of life histories and inhabiting a wider range of habitats.

It was assumed that red drum close to their true maximum age were caught by the long-term adult red drum sampling programs in the north and south regions, allowing *M* to be estimated by the Then et al. (2015) method. The maximum observed age was 62 years in the northern stock and 41 years in the southern stock.

Though the Hoenig method was favored in previous red drum assessments (SEDAR 44; ASMFC 2017b), the revised maximum age based estimator presented by Then et al. (2015) is now recommended as the best estimator of age-constant natural mortality (Then et al. 2015; Hoenig et al. 2016; Hoenig 2017), and as such was the primary age-constant natural mortality estimator considered in the current assessment. A notable property of the Then et al. (2015) estimator relative to the Hoenig (1983) estimator is that for a given maximum age it will always provide a higher estimate of age-constant M. The Then et al. (2015) estimates of age-constant *M* are 0.11 and 0.16 for the northern and southern stocks, respectively. In comparison, the Hoenig (1983) estimates of age-constant *M* are 0.07 and 0.10 for the given maximum ages in the north and south regions, respectively. This implies the Then et al. (2015) estimators are 67.7% and 61.6% greater than the age-constant M estimates assumed for the northern and southern stocks during SEDAR 44, respectively.

2.5.2 Age-Varying M Approaches

In many stock assessments, constant values for M have been obtained from life history analogies (e.g., maximum age, growth rate parameters) based on the aforementioned empirical studies. However natural mortality is known to scale with body mass and size, resulting in higher M at earlier life stages and lower M as adults (Lorenzen 1996). This is driven by the generality that smaller fish, of a given species, are more vulnerable to death from predation and resource limitations. Several approaches have been considered to provide such size-varying estimates of natural mortality (Lorenzen 1996; Lorenzen 2000; Gislason et al. 2010; Charnov et al. 2013).

For purposes of stock assessments, sizes are related to age to provide age-varying estimates of natural mortality. Herein, consistent with SEDAR 44, we employed the Lorenzen (1996) ocean fit equation for estimating age-varying *M*, scaling the raw age-specific estimates of *M* from age-0 through the maximum age based on the Then et al. (2015) age-constant *M* (where % survival = $100 * e^{-M*t_{max}}$), as described in Hewitt and Hoenig (2005). Length-at-age was estimated using the red drum age-specific K growth models (see Section 2.3) with age-specific M estimates using mid-year lengths from said growth model. Length was then converted to weight-at-age using region-specific weight-length relationships, as reported in SEDAR 44 (Table 39). The Then et al. (2015) based estimate of M for the northern stock was 0.11, which produces a scaling to 0.10% survival from age 0 through age 62. The Then et al. (2015) based estimate of M for the southern stock was 0.16, which produces a scaling to 0.12% survival from age 0 through age 41.

The resulting un-scaled and scaled age-varying M estimates used in the simulation models are provided in Table 7 and Figure 13.

3 HABITAT DESCRIPTION

Habitat information for red drum is summarized from a comprehensive report on sciaenid species habitat information completed by the ASMFC (Odell et al. 2017). See this report for additional detail on red drum habitat.

3.1 Spawning, Egg, and Larval Habitat

Spawning Habitat

Red drum spawn from late summer to late fall in a range of habitats, including estuaries, near inlets, passes, and near bay mouths (Peters and McMichael 1987). Earlier studies illustrated spawning often occurred in nearshore areas relative to inlets and passes (Pearson 1929; Miles 1950; Simmons and Breuer 1962; Yokel 1966; Jannke 1971; Setzler 1977; Music and Pafford 1984; Holt et al. 1985). More recent evidence suggests that in addition to nearshore vicinity habitats, red drum also use high-salinity estuarine areas along the coast (Murphy and Taylor 1990; Johnson and Funicelli 1991; Nicholson and Jordan 1994; Woodward 1994; Luczkovich et al. 1999; Beckwith et al. 2006). Direct evidence of red drum spawning has been documented deep within estuarine waters of the IRL, Florida (Murphy and Taylor 1990; Johnson and Funicelli 1991). More recently, an intensive two-year ichthyoplankton survey consistently collected preflexion (2–3 mm) red drum larvae up to 90 km away from the nearest ocean inlet from June

to October with average nightly larval densities as high as 15 per 100 m^3 of water in the IRL (Reyier and Shenker 2007). Acoustic telemetry results for large adult red drum in the IRL further support estuarine spawning of this species within the IRL system (Reyier et al. 2011).

Spawning in laboratory studies have also appeared to be temperature-dependent, occurring in a range from 22° to 30°C but with optimal conditions between temperatures of 22° to 25°C (Holt et al.1981). Renkas (2010) was able to duplicate environmental conditions of naturally spawning red drum from Charleston Harbor, SC in a mariculture setting, and corroborated that active egg release occurred as water temperature dropped from a peak of ~30° C during August. Cessation of successful egg release was found at 25°C, with no spawning effort found at lower temperatures (Renkas 2010). Pelagic eggs, embryos, and larvae are transported by currents into nursery habitats for egg and larval stages, expectedly due to higher productivity levels in those environments (Peters and McMichael 1987; Beck et al. 2001).

Eggs and Larvae Habitat

Red drum eggs have been commonly encountered in several southeastern estuaries in high salinity, above 25 ppt (Nelson et al. 1991). Salinities above 25 ppt allow red drum eggs to float while lower salinities cause eggs to sink (Holt et al. 1981). In Texas, laboratory experiments conducted by Neill (1987) and Holt et al. (1981) concluded that an optimum temperature and salinity for the hatching and survival of red drum eggs and larvae was 25°C and 30 ppt. Spatial distribution and relative abundance of eggs in estuaries, as expected, mirrors that of spawning adults (Nelson et al. 1991); eggs and early larvae utilize high salinity waters inside inlets, passes, and in the estuary proper. Currents transport eggs and pelagic larvae into bays, estuaries and seagrass meadows (when present), where they settle and remain throughout early and late juvenile stages (Holt et al. 1983; Pattillo et al. 1997; Rooker and Holt 1997; Rooker et al. 1998; Stunz et al. 2002).

Larval size generally increases as distance from the mouth of the bay increases (Peters and McMichael 1987), possibly due to increased nutrient availability. Research conducted in Mosquito Lagoon, Florida, by Johnson and Funicelli (1991) found viable red drum eggs being collected in average daily water temperatures from 20°C to 25°C and average salinities from 30 to 32 ppt. During the experiment, the highest numbers of eggs were gathered in depths ranging from 1.5 to 2.1 m and the highest concentration of eggs was collected at the edge of the channel.

Upon hatching, red drum larvae are pelagic (Johnson 1978) and laboratory evidence indicates development is temperature-dependent (Holt et al. 1981). Newly hatched red drum spend approximately twenty days in the water column before becoming demersal (Rooker et al. 1999; FWCC 2008). However, Daniel (1988) found much younger larvae already settled in the Charleston Harbor estuary. Transitions are made between pelagic and demersal habitats once settling in the nursery grounds (Pearson 1929; Peters and McMichael 1987; Comyns et al. 1991; Rooker and Holt 1997). Tidal currents (Setzler 1977; Holt et al. 1989) or density-driven currents (Mansueti 1960) may be used in order to reach a lower salinity nursery in upper areas of estuaries (Mansueti 1960; Bass and Avault 1975; Setzler 1977; Weinstein 1979; Holt et al. 1983; McGovern 1986; Peters and McMichael 1987; Daniel 1988; Holt et al. 1989). Once inhabiting

lower salinity nurseries in upper areas of estuaries, red drum larvae grow rapidly, dependent on present environmental conditions (Baltz et al. 1998).

Red drum larvae along the Atlantic coast are common in southeastern estuaries, with the exception of Albemarle Sound, and are abundant in the St. Johns and IRL estuaries in Florida (Nelson et al. 1991). Daniel (1988) and Wenner et al. (1990) found newly recruited larvae and juveniles through the Charleston harbor estuary over a wide salinity range. Mercer (1984) has also summarized spatial distribution of red drum larvae in the Gulf of Mexico. More recent studies conducted by Lyczkowski-Shutlz and Steen (1991) reported evidence of diel vertical stratification among red drum larvae found at lower depths less than 25 m at both offshore and nearshore locations. Larvae (ranging between 1.7 to 5.0 mm mean length) were found at lower depths at night and higher in the water column during the day. At the time of the study, water was well mixed and temperature ranged between 26° and 28°C. There was no consistent relationship between distribution of larvae and tidal stage. Survival during larval (and juvenile) stages in marine fish, such as the red drum, has been identified as a critical bottleneck determining their contribution to adult populations (Cushing 1975; Houde 1987; Rooker et al. 1999).

3.2 Juvenile and Adult Habitats

Juvenile Habitat

Juvenile red drum use a variety of inshore habitats within the estuary, including seagrass meadows, tidal freshwater, low-salinity reaches of estuaries, estuarine emergent wetlands, estuarine scrub/shrub, submerged aquatic vegetation, oyster reefs, shell banks, and unconsolidated bottom (SAFMC 1998b; Odell et al. 2017). Smaller red drum seek out and inhabit rivers, bays, canals, boat basins, and passes within estuaries (Peters and McMichael 1987; FWCC 2008). Wenner (1992) indicated red drum juvenile habitats vary slightly seasonally; most often between August and early October, red drum inhabit small creeks that cut into emergent marsh systems and have some water in them at lower tides, while in winter, red drum reside in main channels of rivers ranging in depths from 10 to 50 feet with salinities from one-half to two-thirds that of seawater. In the winter of their first year, 3 to 5 month old juveniles migrate to deeper, more temperature-stable parts of the estuary during colder weather (Pearson 1929). In the spring, they move back into the estuary and shallow water environments. Studies show red drum inhabiting non-vegetated sand bottoms exhibit the greatest vulnerability to natural predators (Minello and Stunz 2001). Juvenile red drum in their first year generally avoid wave action by living in more protected waters (Simmons and Breuer 1962; Buckley 1984).

In the Chesapeake Bay, juveniles (20-90 mm TL) were collected in shallow waters from September to November, but there is no indication as to the characteristics of the habitat (Mansueti 1960). Some southeastern estuaries where juvenile (and sub-adult) red drum are abundant are Bogue Sound, NC; Winyah Bay, SC; Ossabaw Sound, and St. Catherine/Sapelo Sound, GA; and the St. Johns River, FL (Nelson et al. 1991) and throughout SC (Wenner et al. 1990; Wenner 1992). They were highly abundant in the Altamaha River and St. Andrews/St. Simon Sound, GA, and the Indian River, FL (Nelson et al. 1991).

Peters and McMichael (1987) found in Tampa Bay that juvenile red drum were most abundant in protected backwater areas, such as rivers, tidal creeks, canals, and spillways with freshwater discharge, as well as in areas with sand or mud bottom and vegetated or non-vegetated cover. Juveniles found at stations with seagrass cover were generally smaller in size and fewer in number (Peters and McMichael 1987). Near the mouth of the Neuse River, as well as smaller bays and rivers between Pamlico Sound and the Neuse River, surveys from the NCDMF indicate juvenile red drum were consistently abundant in shallow waters of less than 5 feet. Generally, habitats identified as supporting juvenile red drum in North Carolina can be characterized as detritus laden or mudbottom tidal creeks (in Pamlico Sound) and mud or sand bottom habitat in other areas (Ross and Stevens 1992). In a Texas estuary, young red drum (6-27 mm Standard Length, SL) were never present over non-vegetated muddy-sandy bottom; areas most abundant with red drum occurred in the ecotone between seagrass and non-vegetated sand bottom (Rooker and Holt 1997). In SC, Wenner (1992) indicated very small red drum occupy small tidal creeks with mud/shell hash and live oyster as common substrates (since sub-aquatic vegetation is absent in SC estuaries).

Sub-Adult Habitat

The distribution of red drum within estuaries varies seasonally as individuals grow and begin to disperse. Along the South Atlantic coast, they use a variety of inshore habitats. Late juveniles leave shallow nursery habitats at approximately 200 mm TL (10 months of age). They are considered sub-adults until they reach sexual maturity at 3–5 years (C. Wenner, personal communication). It is at this life stage that red drum use a variety of habitats within the estuary and when they are most vulnerable to exploitation (Pafford et al. 1990; Wenner 1992). Tagging studies conducted throughout the species' range indicate most sub-adult red drum tend to remain in the vicinity of a given area (Beaumarriage 1969; Osburn et al. 1982; Music and Pafford 1984; Pafford et al. 1990; Wenner et al. 1990; Ross and Stevens 1992; Woodward 1994; Marks and DiDomenico 1996; Adams and Tremain 2000). Movement within the estuary is most likely related to changes in temperature and food availability (Pafford et al. 1990; Woodward 1994).

Tagging studies indicate late age-0 and 1 year-old red drum are common throughout the shallow portions of the estuaries and are particularly abundant along the shorelines of rivers and bays, in creeks, and over grass flats and shoals of the sounds. During the fall, those sub-adult fish inhabiting the rivers move to higher salinity areas such as the grass flats and shoals of the barrier islands and the front beaches. With the onset of winter temperatures, juveniles leave the shallow creeks for deeper water in the main channels of rivers (9–15 m) and return again to the shallows in the spring. Fish that reside near inlets and along the barrier islands during the summer are more likely to enter the surfzone in the fall.

By their second and third year of growth, red drum are less common in rivers but are common along barrier islands, inhabiting the shallow water areas around the outer bars and shoals of the surf and in coastal inlets over inshore grass flats, creeks or bays. In the northern portion of the South Carolina coast, sub-adults use habitats of broad, gently sloping flats (up to 200 m or more in width). Along the southern part of the South Carolina coast, sub-adult red drum inhabit

narrow (50 m or less), fairly level flats traversed by numerous small channels, typically 5–10 m wide by less than 2 m deep at low tide (ASMFC 2002).

In general, habitats supporting juvenile red drum can be characterized as detritus or mud-bottom tidal creeks as well as sand and shell hash bottoms (Daniel 1988; Ross and Stevens 1992). Within seagrass beds, investigations have shown juveniles prefer areas with patchy grass coverage or sites with homogeneous vegetation (Mercer 1984; Ross and Stevens 1992; Rooker and Holt 1997). Wenner et al. (1990) collected post-larval and juvenile red drum in South Carolina from June 1986 through July 1988 in shallow tidal creeks with salinities of 0.8–33.7 ppt, although the preferred salinity range in the IRL, Florida is between 19–29 ppt (Tremain and Adams 1995).

Adult Habitat

Overall, adults tend to spend more time in coastal waters after reaching sexual maturity. However, they do continue to frequent inshore waters on a seasonal basis. Less is known about the biology of red drum once they reach the adult stage and accordingly, there is a lack of information on habitat utilization by adult fish. The SAFMC's Habitat Plan (SAFMC 1998b) cited high salinity surf zones and artificial reefs as EFH for red drum in oceanic waters, which comprise the area from the beachfront seaward. In addition, nearshore and offshore hard/live bottom areas have been known to attract concentrations of red drum.

In addition to natural hard/live bottom habitats, adult red drum also use artificial reefs and other natural benthic structures. Red drum were found from late November until the following May at both natural and artificial reefs along tide rips or associated with the plume of major rivers in Georgia (Nicholson and Jordan 1994). Data from this study suggests adult red drum exhibit high seasonal site fidelity to these features. Fish tagged in fall along shoals and beaches were relocated 9–22 km offshore during winter and then found back at the original capture site in the spring. In summer, fish moved up the Altamaha River nearly 20 km to what the authors refer to as “pre-spawn staging areas” and then returned to the same shoal or beach again in the fall. Adult red drum inhabit high salinity surf zones along the coast and adjacent offshore waters, at full marine salinity. Adults in some areas of their range (e.g., IRL, FL) can reside in estuarine waters year-round, where salinities are variable.

4 FISHERY-DEPENDENT DATA SOURCES

Red drum fisheries are primarily recreational and, since the 1990s, exclusively so in the southern states (South Carolina, Georgia, Florida). Some commercial catch continues in northern states, but typically as bycatch in fisheries directed at other species. Fishery-dependent data are presented by fleet and stock designations determined in previous stock assessments. In the northern stock, most commercial and recreational catch comes from North Carolina waters, followed by Virginia, with low and variable catches north of Virginia. There have been similar regulation histories in North Carolina and Virginia, so northern stock fleets cover catches from all states. There are two commercial fleets based on gear differences: a gill net and beach seine fleet (referred to as the North_Commercial_GNBS fleet in Sections 6-8) and a fleet including catch from other commercial gears (primarily pound nets; referred to as the North_Commercial_Other fleet in Sections 6-8). There is also a recreational fleet accounting for

catch by recreational anglers using hook and line gear (referred to as the North_Recreational fleet in Sections 6-8). The three states in the southern stock have had different regulations through time and all regularly contribute to annual red drum catches. Past assessment have had time series starting after most of the commercial catch of red drum was phased out, so there are three recreational fleets accounting for catch by recreational anglers using hook and line gear in each of the three southern stock states (referred to as the SC_Recreational, GA_Recreational, and FL_Recreational fleets in Sections 6-8). Southern stock commercial catch is presented here, but has not been included in unique fleets in past stock assessments.

4.1 Commercial Data

4.1.1 Data Collection and Treatment

4.1.1.1 Commercial Landings

Historical commercial landings (1950 to present) for the Atlantic coast have been collected by state and federal agencies and are provided to the Atlantic Coastal Cooperative Statistics Program (ACCSP) where they are maintained in the ACCSP Data Warehouse. The Data Warehouse was queried in August 2020 for all red drum landings (monthly summaries by state and gear category) from 1950 to 2019 for the east coast of Florida (Miami-Dade/Monroe County border), and all other Atlantic states. Gear categories were based on those used in SEDARs 18 and 44, and are based on knowledge of Atlantic coast red drum fisheries and reporting tendencies. The specific ACCSP gears included in each category can be found in Table 8. Landings from gear categories for the northern stock are aggregated into two groupings for presentation and use in this assessment based on expected similarities in selectivity among gears within each grouping and differences in selectivity between the two groupings. The first grouping includes the Beach Seine and Gill Nets SEDAR gear categories (GNBS fleet) and the second grouping includes the Hook and Line, OTHER, Pound Net, Seine, and Trawls SEDAR gear categories (Other fleet). Landings for the southern stock are aggregated by state, the structure of recreational fleets in this stock, for presentation and use in this assessment.

Landings data from ACCSP were reviewed and approved by state representative partners. In cases where discrepancies occurred, data directly from state databases was preferred to ACCSP Data Warehouse values. This included North Carolina data from 1994-2019 due to better gear allocation in NC trip ticket databases. Virginia harvester reports were used for 1993-2019 due to concerns on gear and area designations. New Jersey provided a custom data set for 2014-2019 containing catch used in direct sale from fishers. New York and Delaware both provided additional landing reports. Florida's commercial fishery ended in 1988, and between 1978 and 1988, reported gears are unreliable. Consistent with SEDAR 44, ACCSP staff extrapolated average gear proportions for Florida gears from 1962-1977 and applied those proportions to 1978-1988.

Landings data collection through time by states accounting for at least 1% of coastwide landings since 1950 are discussed below and are summarized for all Atlantic states in Table 9.

Virginia

The National Marine Fisheries Service (NMFS) collected landings data for Virginia from 1950 through 1992. From 1973 to 1992, Virginia implemented a voluntary monthly inshore dealer reporting system, which was intended to supplement NMFS data. However, it was discovered that better inshore harvest data were required so the VMRC implemented a Mandatory Reporting Program (MRP) to collect Virginia commercial landings data that began January 1, 1993. The program currently is a complete census of all commercial inshore and offshore harvest in a daily format. Data collected are species type, date of harvest, species (unit and amount), gear type, gear (amount and length), area fished, dealer, vessel (name and number), hours fished (man and gear), crew amount, and county landed.

In 2001, several fields listed above (gear length, man hours, vessel information: name and number, and crew amounts) were added to come in compliance with the ACCSP-identified critical data elements. Also, data collection gaps in the NMFS offshore collection program were identified and all offshore harvest that was not a federally permitted species or sold to a federally permitted dealer was added to the MRP. The MRP reports are collected on daily trip tickets annually distributed to all commercially licensed harvesters and aquaculture product owners. All harvesters and product owners must report everything harvested and retained on the daily tickets. The daily tickets are put in monthly folders and submitted to VMRC. The monthly folders are provided by the VMRC and due by the 5th of the following month.

North Carolina

The NMFS, prior to 1978, collected commercial landings data for North Carolina. Port agents would conduct monthly surveys of the state's major commercial seafood dealers to determine the commercial landings for the state. Starting in 1978, the NC DMF entered into a cooperative program with the NMFS to maintain the monthly surveys of North Carolina's major commercial seafood dealers and to obtain data from more dealers. The NC DMF Trip Ticket Program (NCTTP) began on 1 January 1994. The NCTTP was initiated due to a decrease in cooperation in reporting under the voluntary NMFS/North Carolina Cooperative Statistics Program in place prior to 1994, as well as an increase in demand for complete and accurate trip-level commercial harvest statistics by fisheries managers. The detailed data obtained through the NCTTP allows for the calculation of effort (i.e., trips, licenses, participants, vessels) in a given fishery that was not available prior to 1994 and provides a much more detailed record of North Carolina's seafood harvest. Annual landings of red drum were calculated for North Carolina and reported in pounds (whole weight) broken down by month and gear categories developed by the SEDAR 18 Commercial Workgroup. The annual landings are reported on an annual basis of January through December. Data used to calculate the annual landings for North Carolina from 1950 to 2019 included landings from the NCTTP (1994 to 2019), landings from NMFS (1978 to 1993), and landings from historical data (prior to 1978). Prior to 1972, monthly landings were not recorded for North Carolina.

North Carolina also has landings from the recreational use of commercial gear allowed through the possession of a recreational commercial gear license (RCGL). This license allows for limited use of commercial gear to obtain fish for personal consumption. No sale is allowed with this license. Additionally, users must adhere to recreational bag limits. In order to estimate

landings with this gear, North Carolina conducted a random survey of license holders from 2002 to 2007. Questionnaires were mailed to 30% of license holders each month. Information was obtained on locations fished, gears used, species kept and species discarded. A ratio to commercial gillnet landings was used to estimate landings in years before and after the survey.

South Carolina

Prior to 1972, commercial landings data were collected by various federal fisheries agents based in South Carolina, either U.S. Fish and Wildlife Service or NMFS personnel. In 1972, South Carolina began collecting landings data from coastal dealers in cooperation with federal agents. Mandatory monthly landings reports on forms supplied by the DNR are required from all licensed wholesale dealers in South Carolina. Until fall of 2003, those monthly reports were summaries collecting species, pounds landed, disposition (gutted or whole) and market category, gear type and area fished; since September 2003, landings have been reported by a mandatory trip ticket system collecting landings by species, disposition and market category, pounds landed, ex-vessel prices with associated effort data to include gear type and amount, time fished, area fished, vessel and fisherman information. Validation of landings is accomplished via dockside sampling.

At a minimum, South Carolina's trip-ticket program collects data on commercial effort, commercial catch, and economical value. At a minimum, effort data includes gear types and quantity, location, and hours fished. Catch data includes species, disposition of catch, and quantity (lbs) landed. Finally economic data includes the wholesale price paid to fishermen.

Given commercial harvest of red drum has been prohibited in South Carolina since June 1987, the history of red drum landings in South Carolina are not very large (Table 10), particularly relative to other states, with the largest documented landings occurring the year the commercial fishery was shut down (1987). Note, South Carolina has had some very small amount of reported illegal harvest of red drum since their designation as a gamefish.

Georgia

Prior to 1982, the NMFS and its predecessor agencies had been responsible for the collection of commercial fisheries landings data in Georgia. In 1982, with funding from NMFS, the Georgia Department of Natural Resources (GADNR) began collecting weekly and monthly commercial landings data from coastal Georgia. These included catch, area, effort, gear, value and associated data at various levels of detail depending on fishery and data needs. In 2001, Georgia implemented a trip ticket program in accordance with the minimum requirements set forth by the ACCSP partners. Additional data elements were added and the Georgia landings database was upgraded to meet the requirements. Trip level data are collected for all trips landing products in Georgia. Data collected include trip start and unloading dates, area fished, harvester and dealer, gear, species, market size, quantity, and value.

A small-scale gillnet fishery for red drum existed in the 1950s; however, the use of gillnets in Georgia's territorial waters was prohibited by statute in 1957. Since that time the commercial fishery for red drum was comprised predominately of hook and line recreational anglers and for-hire fishers that sell their catch. This catch was often sold directly to restaurants and not documented in commercial landings reporting. These landings are considered recreational (i.e.,

captured in the recreational catch survey – see Section 4.2.1) and all sale was restricted to the recreational bag limit. Red drum were granted game-fish status in 2013 thereby making commercial sale illegal.

Florida

Commercial landings information was obtained from the FL FWC's Marine Fisheries Information System data and from the Fisheries Statistics Division of the NMFS for the years 1950 to 1988. No commercial landings have been reported for Florida since 1988 when the sale of native-caught red drum was prohibited.

Prior to 1986, landings of red drum were reported to the NMFS through monthly dealer reports made by major fish wholesalers in Florida. Since 1986, information on what is landed and by who in Florida's commercial fisheries comes from the FWC's Marine Resources Information System, commonly known as the trip-ticket program. Wholesale dealers are required to use trip tickets to report their purchase of saltwater products from commercial fishers. Conversely, commercial fishers must have Saltwater Products Licenses to sell saltwater products to licensed wholesale dealers. In addition, red drum became a "restricted species" in late 1987 so only fishers who had Restricted Species Endorsements on their Saltwater Products License qualified to sell red drum (though commercial fishing effectively ended shortly after this in 1989). Each trip ticket includes the Saltwater Products License number, the wholesale dealer license number, the date of the sale, the gear used, trip duration (time away from the dock), area fished, depth fished, number of traps or number of sets where applicable, species landed, quantity landed, and price paid per pound. During the early years of the program some data fields were deleted from the records, e.g., Saltwater Products License number for much of 1986, or were not collected, e.g., gear used was not a data field until about 1991.

The commercial fishery for red drum in Florida ended in 1989 when a 'no sale' provision was enacted into law.

4.1.1.2 Commercial Discards

Currently, the only available data to describe commercial discards are from an observer program for the North Carolina estuarine gill net fishery for the period of 2004 to 2006 and 2008 to 2019. The North Carolina estuarine gill net fishery is presumed to be the primary culprit of commercial red drum discards in North Carolina. Gill nets typically account for >90% of red drum commercial harvest in North Carolina. In SEDAR 18 and the ASFMC 2017 assessments, discard estimates were calculated by area and season for both large and small mesh gill nets. Large mesh gill nets were defined as having a stretched mesh webbing of five inches or greater. CPUE was defined as the number (or weight) of dead red drum observed per trip. In addition, a release mortality (5%; consistent with SEDAR 18) was added for red drum released alive. Total gill net trips taken using estuarine gill nets in North Carolina were available through the NCTTP. Extrapolation by area and season was accomplished by multiplying the observed CPUE by the number trips made for either large or small mesh gill nets. Direct estimates from gill net observer data were available for the years of 2004 to 2006 and for 2008 to 2013. From these years, a ratio of harvest to discards was calculated and used to estimate discards in the remaining years.

For the current assessment, discard estimates were estimated using a generalized linear model (GLM) framework to predict red drum discards in North Carolina's estuarine gill-net fishery based on data collected during 2004 through 2019. This model used effort data from the NCTTP and discard data from the observer program (Table 11). Only those variables available to both data sources could be considered as potential covariates in the model. Available variables included mesh size, year, season and area; these were all treated as categorical variables in the model. Mesh sizes were categorized as large (≥5 inches) or small (<5 inches). Effort was measured as soak time (days) multiplied by net length (yards). Live and dead discards were modeled separately.

All available covariates were included in the initial model and assessed for significance using the appropriate statistical test. Non-significant covariates were removed using backwards selection to find the best-fitting predictive model. In this case, all covariates were significant. The offset term was included in the model to account for differences in fishing effort among observations (Crawley 2007; Zuur et al. 2009; Zuur et al. 2012). Using effort as an offset term in the model assumes that the number of red drum discards is proportional to fishing effort (A. Zuur, Highland Statistics Ltd., pers. comm.).

The best-fitting model was a negative binomial GLM that included mesh size, year, season and area as significant covariates for modeling both the live (dispersion = 3.2) and dead discards (dispersion = 1.7) in numbers. Results of the GLM provided discard estimates that were similar to those direct estimates derived from the extrapolation method used in prior assessments (Figure 14). Data for the GLM were unavailable prior to 2004, the year the NC gill net observer program began. For this reason, a ratio of harvest to discards was calculated and used to estimate discards in the remaining years consistent with the prior assessment.

Red drum released alive were assumed to have a 5% mortality consistent with assumptions of prior assessments.

4.1.1.3 Biological Sampling

Maryland

The Maryland Department of Natural Resources (MD DNR) has monitored commercial pound nets primarily in the Chesapeake Bay and mouth of the Potomac River since 1993. No cooperating fishermen could be located on the Potomac River in 2009 and sampling was not conducted in this area that year, but resumed in 2010. The lower portions of other rivers such as the Nanticoke and Honga Rivers have been sampled sporadically depending on year. Each site was generally sampled once every two weeks from May - September, weather and fisherman's schedule permitting. The commercial fishermen set their nets as part of their regular fishing activity. Net soak time and manner in which they were fished were consistent with the fisherman's day-to-day operations. All red drum captured were measured to the nearest mm TL (maximum or pinched). Other data collected includes water temperature (°C), salinity (ppt), and soak time (duration in minutes).

Red drum have been encountered sporadically throughout the 27 years of the commercial pound net survey, with none measured in nine years of the time series. Sixty-one percent of all red drum recorded by this survey were measured in 2012 (458 fish), a year of unusually high

presence of red drum in the Chesapeake Bay. TL of red drum has ranged from 187 - 1332 mm, though almost all individuals encountered by this survey were outside of the commercial slot limit (18”-25”). None of the 458 red drum sampled in 2012 were of legal size.

Virginia

Commercial length frequency data were obtained by the VMRC Biological Sampling Program (BSP). Red drum lengths and weights were collected at local fish houses by gear, area fished, and individual watermen.

Fish were measured for both TL and FL (mm) and individual weight (nearest 0.01 lb). Typically in this program, otoliths, as well as sex and maturity data, are collected from a subsample of fish encountered. However, due to the infrequency of red drum encounters, sampling is more opportunistic and all fish encountered by technicians are sampled. Similarly, a subsample of collected age samples would be selected for full ageing, but with red drum our ageing lab processes every otolith collected due to their typically small sample size.

Major commercial gears for Virginia are pound nets, anchored gill nets, and haul seines. Commercial samples were taken throughout the year and from all areas where red drum were landed. Fishery-dependent length frequency data collection for red drum in Virginia began in 1989. Red drum sampling events have remained relatively infrequent throughout the lifetime of the program, but sampling does occur in a representative manner annually. Virginia has collected 2,548 length and 794 age samples since 1989, averaging 79 lengths and 25 ages on a yearly basis.

North Carolina

Commercial length frequency data were obtained by the NCDMF commercial fisheries-dependent sampling program. Red drum lengths were collected at local fish houses by gear, market grade (not typical for red drum), and area fished.

Individual fish were measured (mm, FL) and total weight (0.1 kg) of all fish measured in aggregate was obtained. Subsequent to sampling a portion of the catch, the total weight of the catch by species and market grade was obtained for each trip, either by using the trip ticket weights or direct measurement. Length frequencies obtained from a sample were then expanded to the total catch using the total weights from the trip ticket. All expanded catches were then combined to describe a given commercial gear for a specified time period. Major commercial gears for North Carolina are gill net, long haul seine, and pound net. Commercial samples were taken throughout the year and from all areas where red drum were landed. Fishery-dependent length frequency data collection for red drum in North Carolina began in the early 1980s. Data adequate to describe the major fisheries is available beginning in 1989.

Since the late 1980s North Carolina has been the major commercial harvester of red drum, typically accounting for >90% of the coastwide annual commercial landings. Since 1989, greater than 100 lengths have been obtained annually with the majority coming from the primary gear used to harvest red drum, gill nets, followed by pound nets and haul seines (Table 12).

Lengths of discarded fish have also been recorded by observers during the observer program (Table 11). Number of lengths collected annually have ranged from 98 (2011) to 1,929 (2013).

South Carolina

Given the nature of the SCDNR commercial sampling program, the ban on commercial harvest of red drum in South Carolina since June 1987, and the lack of length sampling of the commercial harvest, there is limited to no length information available on the lengths of commercially harvested fish from South Carolina.

4.1.1.4 Catch Composition

Length distributions for North Carolina commercial landings were derived from length data provided from commercial fish house sampling. All length distributions were described annually in two-centimeter length bins with the length bin provided representing the floor (i.e., 46 cm = 46.0 to 47.99 cm). A minimum of 20 lengths by year and gear were required to represent the length distribution of a gear. Collapsing, when necessary, occurred across gears within a year. For hook and line gears, length frequency distributions from the recreational fishery (see Section 4.2.1) were used as a proxy. Prior to 1989, sample sizes were sparse and were not considered adequate to describe the fishery. For this reason, the previous red drum assessment began with 1989 as the beginning year for all catch-at-age data. Since 1989, sampling was adequate for the vast majority of the landings (i.e., gill net landings in North Carolina) and pooling was limited to minor gears/landings (Table 12).

Conversion of North Carolina commercial landings in weight to numbers was based on mean weights obtained from the commercial fish house sampling. In the rare instance when sample sizes were inadequate (n<20) by gear and year, a weighted average was obtained by pooling across gears within a year. For hook and line gears, mean weights from the recreational fishery (see Section 4.2.1) were used as a proxy. Landings in numbers are reported in Table 13.

An annual age length key representing the North Carolina catch was developed using all available age data from North Carolina. Any “holes” in the age-length key were filled using a pooled (across all years) key.

4.1.1.5 Catch Rates

Trip level commercial data were available from North Carolina (1994 to 2019) and Virginia (1993 to 2019), however, catch effort data from the red drum commercial fishery were confounded by trip limits put into place in 1992 for Virginia and in 1998 for North Carolina. Trip level information was also available in Florida but only for the years 1986 to 1988. After 1988, the sale of native caught red drum in Florida became prohibited.

4.1.2 Trends

4.1.2.1 Commercial Landings

Northern Stock

Northern stock red drum landings by the commercial gillnet and beach seine (GNBS) fleet were primarily landed with beach seines in the 1950s and early 1960s (Figure 15). Total landings were highest in the early 1950s, averaging 206,220 lbs. from 1950-1954, then declined to the lowest levels of the time series in the late 1960s (minimum of 1,400 lbs. in 1969). Landings then

increase and transition to coming from mostly gill nets in the 1980s. Landings have varied without much discernible trend since the 1980s, averaging 137,186 lbs from 1980-2019.

Northern stock red drum landings by the commercial fleet fishing other gears decline from the earliest years to low levels in the late 1960s (Figure 16). Landings then increase to higher levels in the 1970s and 1980s, averaging 80,870 lbs. Landings decline through the 1990s and remain at lower levels during recent years, averaging 15,136 lbs. since 2000. Pound nets have accounted for a large proportion of the total landings throughout the time series, while trawls accounted for large proportions in the early 1950s and 1980s. Seines also accounted for a large proportion of landings from the 1960s through 1990s.

Estimated landings from RCGL gill nets in North Carolina ranged from a high of 23,136 pounds in 1999 to a low of 2,408 pounds in 1997 (Table 14). 2013 was the second highest estimate in the time series.

Overall, northern stock red drum landings were consistently high in the early 1950s, averaging 307,040 lbs. from 1950-1954, then decreased through the 1960s to time series lows (minimum of 5,000 lbs. in 1969, Figure 17). Landings increased through the 1970s and 1980s and have shown high interannual variability since, ranging from 58,951 lbs. in 1997 to 429,654 lbs. in 2013. The GNBS fleet accounted for most of the commercial red drum landings in the northern stock in the beginning of the time series through the mid-1960s. The other gear commercial fleet became a primary contributor to landings in the mid-1960s through the 1970s when seines accounted for a large proportion of this fleets landings. Landings by the other gear fleet then decline and commercial landings have come primarily from the GNBS fleet since the 1990s. The RCGL landings have accounted for ≈5% of landings (9,278 lbs.), on average, since these data have been available (1989).

Southern Stock

Overall, southern stock red drum commercial landings were highest during the 1950s when all southern states made significant contributions to the landings, averaging 204,986 lbs. from 1950-1956 (Figure 18). Landings then declined to low, stable levels and came mostly from Florida as South Carolina and Georgia made only minor contributions. Landings averaged 136,333 lbs. from 1957-1984. During the mid-1980s the commercial fisheries faced tightening restrictions resulting in declining landings prior to being prohibited in Florida after 1987. Commercial landings from the southern stock were, for the most part, phased out by 1989.

4.1.2.2 Commercial Discards

Northern Stock

Total commercial discards from North Carolina gill net fisheries have generally varied without any discernable trend throughout the time series (Figure 14). Total dead discards averaged 18,759 fish from 2004-2019 and ranged from 2,452 fish in 2011 to 68,862 fish in 2013 (Table 11).

4.1.2.3 Catch Composition

Northern Stock

Length distributions for North Carolina are presented by major gears in Table 15. For the length distributions, all gears showed a notable shift towards larger fish, particularly after 1991 when North Carolina implemented a minimum size limit change from 14 to 18 inches TL (Figure 19). Likewise, the harvest of larger red drum has declined as harvest and sale of federally harvested adult red drum became illegal after 1992 in North Carolina.

The majority of discarded lengths observed in the estuarine gill net fishery were from fish below the minimum size limit of 18 inches TL (approximately 44 cm FL) with some discards occurring within the slot likely due to exceeding the daily trip limit and fewer over the slot limit (Figure 20).

The North Carolina catch-at-age for all removals is provided in Table 16. Similar to shifts in the length distributions, a notable shift in the age distribution from age-1 to age-2 fish was noted in 1992. Current commercial harvest of red drum within the existing slot limits is primarily on age-2 and to a lesser extent age-1 and age-3 fish.

4.1.3 Potential Biases, Uncertainty, and Measures of Precision

Collection of commercial landings data has been designed as a census to capture total landings, but methods to collect these data have changed through time likely leading to changes in uncertainty. There are no quantitative measures of uncertainty accompanying commercial landings data, but Table 9 shows changes to landings data collection methodology by state through time. Each methodology is anticipated to be an improvement to the data collection methodology that preceded it. Commercial landings data uncertainty was an issue addressed during a Best Practices Workshop convened by SEDAR (SEDAR 2015b). The recommendation produced from this workshop was to assume uncertainty decreases as the data collection methodology changes through time, resulting in time blocks of decreasing uncertainty levels from historic to current data collection methods.

4.2 Recreational

4.2.1 Marine Recreational Information Program

4.2.1.1 Introduction and Methodology

The primary source of red drum recreational catch data along the Atlantic coast is the Marine Recreational Information Program (MRIP). MRIP consists of three general surveys to estimate recreational catch, the Access Point Angler Intercept Survey (APAIS), the Fishing Effort Survey (FES), and the For-Hire Survey (FHS). The APAIS is a dockside survey where interviewers intercept anglers returning from fishing trips to collect information on catch and fishing area. Data are used to estimate species-specific catch rates by disposition, characterize the size structure and weight of fish harvested, and determine the proportion of fishing effort occurring in three general areas of marine waters (inland, state seas from the coastline out to three miles, and the federal EEZ beyond three miles from the coastline). Dispositions reported by anglers include harvested and either available for inspection (Type A catch) or unavailable for

inspection (e.g., fileted at sea, Type B1 catch) and released alive (Type B2 catch). The FES is a mail-based survey that collects data on fishing effort by anglers from U.S. households fishing from shore and private/rental boats to estimate total fishing effort. The FHS is the counterpart to the FES that collects data on fishing effort by for-hire charter boat and headboat captains through a telephone survey. Each of these components of the MRIP survey have undergone design changes since 1981, with a brief description of survey design changes below. Interested readers who would like more details on the survey design changes are encouraged to review the resources available through the NMFS Office of Fisheries Statistics (www.fisheries.noaa.gov/recreational-fishing-data/about-marine-recreational-information-program)

MRIP surveys implement a stratified sampling design, stratifying by state, year, wave (bimonthly period), and fishing mode (shore, private/rental boat, headboat, and charterboat). Catch rate data collected during the APAIS for each strata are applied to total effort data from the FES and FHS to estimate total harvested catch (Type A+B1 catch) and total catch released alive (Type B2 catch). The area data collected during the APAIS are used for post-stratification of estimates by area.

Biological data collected during the APIAS sampling include FL and weight of Type A fish. Both are collected opportunistically but field interviewers are instructed to measure and weigh up to fifteen fish of each available species from each angler interviewed. The individual fish are to be selected from the total landed catch at random to avoid any size-bias in the resultant sample. These data are used to estimate harvest in weight and the size composition of harvested fish.

Two significant changes have occurred to the MRIP survey methodologies based on external reviews and recommendations through the duration of the program. The APAIS was redesigned in 2013 to improve the sampling design and the use of APIAS data in catch estimation methods. In 2018, the telephone-based effort survey used historically to collect effort data from U.S. households (Coastal Household Telephone Survey-CHTS) was replaced with the current mail-based FES. Since the last red drum stock assessment occurred before the effort survey change, historical estimates prior to 2013 used in that assessment were calibrated to correct for the APAIS redesign in 2013, but all estimates used in the previous assessment were based on CHTS effort data. MRIP now provides all historical estimates prior to 2018 with calibrations applied to correct for both the APIAS redesign changes and the transition to the mail-based FES and this is the first assessment to report these calibrated red drum catch estimates. The FES generally results in significant increases in effort estimates and, therefore, total catch estimates relative to the CHTS.

4.2.1.2 Trends

4.2.1.2.1 Catch Rates

In addition to being used for total catch estimation, catch rate data collected during APAIS sampling have been used to generate relative indices of abundance for past red drum stock assessments and as such were updated for this simulation assessment. Both nominal indices and indices standardized to account for factors affecting nominal catch rates are calculated,

with the latter used in past stock assessment models. Methods to generate these indices are described in Appendix 1.

Northern Stock

In the northern stock, catch rates decreased from 1991 – 1996, then increased and became variable around a higher mean from 1997 – 2019 (Figure 21). Catch rates were highest in 2012 and lowest in 1996. Nominal catch rates largely trended with the standardized catch rates and were just outside the standardized confidence intervals.

Southern Stock

In the southern stock, standardized catch rates were variable with an increasing trend across the time series (Figure 22). Nominal catch rates largely agreed in trend with the standardized catch rates and were mostly within the standardized confidence intervals. However, the standardized index predicted a slightly lower rate of increase over time compared to the nominal index.

4.2.1.2.2 Total Catch

Investigated herein were harvest, numbers released, dead discards, and total removals (harvest + dead discards) annually. Dead discards, and subsequently total removals, were calculated based on an 8% discard mortality rate for recreationally captured and released red drum, consistent with SEDAR 18 and SEDAR 44.

Total Harvest

Northern Stock

The change to effort estimation methodology resulted in a significant increase in calibrated harvest estimates (Figure 23), but had less impact on trend of estimates. With calibrations applied for both the APAIS changes and effort survey methodology changes, estimates increased an average of 182% (≈150,000 fish) during the time series of the replaced, telephone-based CHTS (1981-2017).

Harvest from the northern stock was relatively high in the 1980s, decreased significantly in 1990, and remained at these lower levels through the mid-2000s (Figure 24). Harvest then increased through the remainder of the time series, including the three highest annual harvests during the time series (2013, 2014, and 2017). Interannual harvest is highly variable reflecting year class strength in this recruitment-based fishery.

Proportional standard error (PSE) for harvest estimates is higher in the 1980s, exceeding 40% in three years and 60% in one year (Figure 25). PSEs then decline and remain below 40%. Estimates with PSEs below 40% are considered valid inputs for stock assessment models, while estimates with values between 40% and 60% should be used with caution, and any estimates with PSEs >60% should be used with extreme caution (ACCSP 2016). Harvest estimates with confidence intervals are provided in Figure 26.

Southern Stock

The change to effort estimation methodology resulted in a significant increase in calibrated harvest estimates for all three southern stock states (Figure 27). The change had less impact on trend of estimates, with some exception during recent years in South Carolina and Georgia. With calibrations applied for both the APAIS changes and effort survey methodology changes, estimates increased an average of 164% (≈175,000 fish), 151% (≈115,000 fish), and 253% (≈420,000 fish) in South Carolina, Georgia, and Florida, respectively, during the time series of the replaced, telephone-based CHTS (1981-2017).

Patterns of harvest from states in the southern stock have been similar to the northern stock, with higher harvest early in the time series, lower harvest in the middle of the time series, and higher harvest in recent years (Figure 28). Florida has accounted for the most harvest, followed by South Carolina and then Georgia.

Patterns in PSEs have been similar in Georgia and Florida, with higher PSEs, a few exceeding 40% and 60% (in Florida), into the early 1990s and then lower PSEs (all <40%) since (Figure 29). PSEs for South Carolina harvest also start high, with some exceeding 40% and 60% in the 1980s, and, although all except in 1995 are <40%, are more variable in recent years than in the other states. Harvest estimates with confidence intervals are provided in Figure 30.

Total Discards

Northern Stock

The change to effort estimation methodology resulted in a significant increase in calibrated released alive estimates (Figure 31). The change had less impact on trend of estimates, but did show some divergence in the most recent years. With calibrations applied for both the APAIS changes and effort survey methodology changes, estimates increased an average of 168% (≈900,000 fish) during the time series of the replaced, telephone-based CHTS (1981-2017).

Red drum released alive in the northern stock accounted for a smaller proportion of total catch in the 1980s, but then increased through the remainder of the time series and account for an increasing majority of total catch (Figure 24). Assuming an 8% discard mortality due to catch, consistent with past stock assessments, dead discards account for a similar proportion of catch as the harvest since the late 1990s.

PSEs for discarded catch are high in the 1980s and regularly exceed 60% (Figure 25). PSEs then decline to levels lower than 40% in the mid-1990s and become similar to PSEs for harvested catch through the remainder of the time series. Discard estimates with confidence intervals are provided in Figure 26.

Southern Stock

The change to effort estimation methodology resulted in a significant increase in calibrated released alive estimates for all three southern stock states (Figure 32). The change had less impact on trend of estimates in Florida, but did impact the trend at various time periods in South Carolina (late 2000s, and 2010s) and Georgia (late 1980-early 1990s, 2010s). With calibrations applied for both the APAIS changes and effort survey methodology changes,

estimates increased an average of 166% (≈430,000 fish), 116% (≈168,000 fish), and 249% (≈1,620,000 fish) in South Carolina, Georgia, and Florida, respectively, during the time series of the replaced, telephone-based CHTS (1981-2017).

Red drum released alive in the southern stock have also increased through the time series and become bigger components of the catch, though these changes have occurred differently in each of the states (Figure 28). Releases have exceeded harvest since the late 1980s in Florida, since the mid-1990s in South Carolina, and since the early 2000s in Georgia. As with harvested fish, Florida has accounted for the most followed by South Carolina and then Georgia. With the assumed 8% discard mortality, dead discards have yet to exceed harvested catch in any of the southern states as seen in the northern stock. However, annual dead discards still account for a significant proportion of annual total removals, averaging 32%, 19%, and 27% in South Carolina, Georgia, and Florida, respectively, during the last five years of the time series (2015-2019).

PSEs were high in South Carolina and Georgia through the 1990s, exceeding 40% and 60% in some years (Figure 29). PSEs then decrease markedly around 2000 and become similar to harvest (Georgia) or lower than harvest PSEs (South Carolina). PSEs for Florida discards are at or above 40% and <60% in a few years in the early 1980s then decline to low levels similar to harvest PSEs. Discard estimates with confidence intervals are provided in Figure 30.

Total Removals

Northern Stock

When harvest and dead discards are combined, total removals from the northern stock initially decreased from highs in the early- to mid-1980s and remained low and stable through the mid- to late-1990s (Figure 33). From these lows, total removals have steadily increased to all time high levels in recent years.

Assuming PSEs for dead discard estimates are equal to PSEs for released alive estimates, PSEs for total removals were higher in the 1980s, exceeding 40% in several years, decreased to levels around 20% in the early to mid-1990s, and decreased further in the late 1990s (Figure 34). There was an increase in the 2010s, but PSE have been below 20% every year since 1996 except 2017.

Southern Stock

When harvest and dead discards are combined, total removals from the southern stock initially decreased in each state from highs in the early- to mid-1980s (Figure 35). Trends then differ by state. In South Carolina, total removals continue to decline through the 1990s, then increase through the remainder of the time series. Total removals generally increased since the 1980s in both Georgia and Florida, but at a greater rate in Florida. Removals have increased in recent years to levels similar to the 1980s in all states.

PSEs in all states have decreased through time and have remained below 40% since the 1980s (Figure 36).

4.2.1.2.3 Catch Composition

Harvest

Length composition data for harvested fish are readily available from MRIP and were the primary composition data set used in the simulation tuning process (Section 6.2.3), and were therefore prioritized for this assessment. Age composition data are available from the last stock assessment through 2013 and were not updated here. These data indicate fairly consistent age compositions dominated by age-2 fish in more recent years for most fleets and can be seen in Appendix 4 (northern stock, appendix Figures 28-29) and Appendix 5 (southern stock, appendix Figures 24-29). Age composition data sets will be updated in the following benchmark stock assessment.

Northern Stock

Annual length compositions for fish harvested from the northern stock are in Figure 37. When aggregated within regulation periods (Figure 38), length compositions show a shift to larger sizes in later years (>1991) as well as decreasing catches of larger fish protected by the slot limit.

The number of MRIP primary sampling units (PSUs), which is a unique interviewer assignment for sampling catch, with red drum encountered for length measurements are presented here as a proxy for length composition sampling replicates (i.e., precision), assuming a clustered sampling design (i.e., lack of independence). Clustered sampling results in sample sizes less than the absolute number of individuals measured for size due to aggregations of like-sized individuals available to catch of anglers fishing at the same sampling unit (Nelson 2014). The number of PSUs encountering red drum in the northern stock increased through the mid-1990s and have since varied without trend (Figure 39).

Southern Stock

Annual length compositions for fish harvested from the southern stock states are in Figure 40, Figure 41, and Figure 42 for South Carolina, Georgia, and Florida, respectively. When aggregated within regulation periods (Figure 43-Figure 45), length compositions show regulatory-induced shifts such as narrowing slot limits.

PSUs in South Carolina and Georgia varied without much trend since increasing after the first few years of the time series (Figure 46). PSUs in Florida increased to the highest levels in the 2000s and declined to lower levels in recent years.

Discards

A primary data limitation in past red drum stock assessments has been the lack of data to describe the length and age composition of fish released alive in recreational fisheries. Because a portion of these fish are assumed to die due to interaction with the fishery (i.e., fishing mortality) and this component of the catch has become an increasingly large proportion of the total recreational catch, the lack of these data introduce a growing uncertainty in stock assessment. Several sources of auxiliary data were explored during the data workshop. These included state tagging programs (Section 4.3) and phone applications designed to collect voluntary data from anglers (iAngler- http://angleractionfoundation.com/iangler and MyFishCount - https://www.myfishcount.com/).

The tagging programs covering the southern stock (Georgia and South Carolina) and northern stock (North Carolina and Virginia) may provide useful data. The data sets include large sample sizes collected throughout the states dating back the full time series of assessment periods in past stock assessments (see Table 17 and Figure 47-Figure 48 for South Carolina tagging program and Appendix 2 for North Carolina and Virginia tagging data). However, as was noted in past assessments (Arnott and Paramore 2015), there are some potential biases, particularly for the South Carolina and North Carolina angler tagging programs, that may preclude the use of these data in the benchmark assessment. One potential bias stems from instructions to anglers on what sizes should be tagged and changes to these instructions through time.

The iAngler data are limited in sample size and almost exclusively from Florida catches (Table 18 and Figure 49), but these data have been used in Florida state stock assessments. MyFishCount data were far more limited as it is a new application with data only available since 2018 (61 release lengths measured). Therefore, these data are of no utility for characterizing historical size compositions but may be of more utility going forward in stock assessment.

Additional work is needed to determine utility and reliability of the various data sets for describing composition of the discarded recreational catch including sample size requirements/thresholds, how to address tagging size instruction biases, and whether data is representative of surrounding states in the cases where data borrowing/gap-filling is necessary to support regional stock assessments. Given the use of these data in previous stock assessments for southern states and the potential for these data to be used in the future to describe the age and length composition of released red drum, the SAS decided to provide composition data as inputs for the assessment models during this simulation assessment in base scenarios for the southern stock but not the northern stock despite data not being readily available for the tuning process in this simulation assessment. The SAS also explored the inclusion of size and age composition data for released red drum through the data prioritization scenarios.

4.2.2 Supplemental Recreational Sampling

There are several recreational fishery monitoring efforts by state agencies conducted aside from the general MRIP survey. The primary purpose of these efforts in past stock assessments has been to provide supplemental age-length key data for generating age composition data.

Virginia

Since 2007, the VMRC has operated a recreational carcass recovery program known as the Marine Sportfish Collection Project. The goal of this project is to both supplement the Biological Sampling Program with species that are traditionally scarce in the commercial sector and serve to characterize VA's recreational fishing activity. Chest freezers are established near the fish cleaning stations at a rotating series of marinas and boat ramps in the Chesapeake Bay region, depending on seasonality and freezer availability. Each freezer is marked with an identifying sign and a list of target fish species. Cooperating anglers place the filleted carcasses, with head and tail intact, in a bag, drop in a completed donation form, and then place the bag in the freezer. Each fish is identified to species, the fish length is measured, sex is determined when possible, and the otoliths are removed. These otoliths are incorporated into the subsampling

scheme of VMRC's ageing lab, with their original recreational status recorded for later reference.

The number of red drum collected by the Marine Sportfish Collection Project has traditionally been low, with notable peaks in 2009 (n=73) and 2013 (n=79) with 416 total samples recovered since 2007. These fish ranged in size from 405-1146 mm TL with an average of 558 mm TL.

North Carolina

In 2014, the NCDMF initiated a formal Carcass Collection Program. The objective of the project is to develop a statewide freezer collection program in order to obtain fishery-dependent length, sex and age samples of recreationally important fish. Since the beginning of the program, the NCDMF has maintained eight operational freezer sites where carcass collection occurs. Sites include tackle stores, fishing piers, shore access points and local NCDMF offices. NCDMF staff make scheduled checks to freezers to collect carcasses and resupply freezers with collection bags and information cards. Fish samples collected from the freezers are processed and entered into the NCDMF biological database. Information collected includes species of fish, length of fish, sex, otoliths for aging and catch information (fishing mode, date, location etc.). Samples of red drum collected annually have ranged from 3 (2014) to 90 (2017) with a total of 229 collected from 2014 to 2019. The majority of red drum collected in the carcass collection program are age-2 with some age-1 to age-3 fish. This range of ages is consistent with the size of fish that can be legally harvested in the 18 to 27 inch slot limit.

South Carolina

Inshore Fisheries-Dependent Biological Sampling Programs

Given the limited information on the size and age of recreationally harvested fish from South Carolina waters, the SCDNR Inshore Fisheries Research Section conducts two fishery-dependent biological sampling programs, namely a fishery-dependent freezer fish program and a fishery-dependent tournament sampling program. Both are designed to collect biological information on the size, age, and sex composition of recreationally harvested priority species. Red drum are included as a priority species of interest for both programs.

Freezer Fish Program

Since 1995, Inshore Fisheries has operated a freezer drop off program for recreationally important inshore finfish, enabling us to obtain fish from areas and habitats not always represented in SCDNR monthly field sampling. Chest freezers are located near collaborating marinas, landings, or bait shops along the South Carolina coast. Participating anglers place the filleted rack with head and tail intact in one of the provided bags, drop in the completed catch information card, and deposit the bag in the freezer. Freezers are checked periodically by SCDNR staff and provided fish racks are brought back to SCDNR facilities for processing. Once in the lab, fish are identified to species, lengths are recorded, sex and maturity status are determined when possible, genetic samples are collected, and otoliths are removed. Otoliths are aged annually with each recreational capture day considered an independent collection event.

The number of red drum collected by the Inshore Freezer Fish Program is relatively low (Table 19) with the bulk of collections occurring from 1995 to 2003 (n=1,412). Collections have

declined further in recent years with ranges from 100 in 2007 to 0 in 2021, with an average of 50 collected annually from 2004 to 2021. Historically, 2,264 have been processed by staff since the program began ranging in size from 343-810 mm TL with an average of 484 mm TL.

Tournament Program

Inshore Fisheries began participating in Recreational Angler tournaments in 1986. Inshore staff act as weigh master at tournaments and collect biological samples from fish of participating anglers. Similar to the freezer fish program, fish are identified to species, lengths are recorded, sex and maturity status are determined through gross and histological sampling, genetic samples are collected, and otoliths are removed.

Since 1986, 999 red drum have been sampled at tournaments (Table 19) with a minimum size of 277 mm TL and a maximum size of 1,150 mm TL. Average size is 552 mm TL.

State Finfish Survey

Implemented in 1988, the State Finfish Survey (SFS) was designed to address specific data gaps, within the MRFSS (precursor to MRIP), as identified by SCDNR staff. These data gaps included the lack of length data from species of concern to the SCDNR and the lack of seasonal and area-specific catch frequencies. Another concern was the lack of catch and effort data from private boat anglers, which make up a majority of the angling trips in South Carolina coastal waters. These data gaps were initially addressed by interviewing inshore anglers targeting red drum and spotted seatrout at specific sample locations. Since 2002, more emphasis has been placed on acquiring length data from all finfish retained by anglers, canvassing at additional sampling locations, and interviewing all private fishing boats within all South Carolina coastal areas. Broadening the scope of the survey may decrease some of the bias associated with the previous SFS protocol.

Sampling is conducted at public and selected private (with owner's permission) boat landings from January through December using a questionnaire and interview protocols similar to those of the MRFSS. However, the SFS questionnaire focuses on vessel surveys rather than individual angler surveys and primarily targets private boats. Interviews are obtained from cooperative anglers at each sampling site. If an angler is unwilling to participate; they can decline to be interviewed. Assigned Creel Clerks interview as many anglers as time allows at any given site.

The sampling schedule is determined by "needs assessments" of the SCDNR Marine Resources Division and creel clerks. Individual Creel Clerks are assigned to a sampling region and will determine their daily sampling schedules based on local conditions (i.e., weather, landing closures, or events), additional job duties, and research and management initiatives. Attempts are made to assess all sampling sites equally, and individual creel clerks randomly rotate between all sampling locations within their region. Creel clerks will remain at landings with fishing activity. If landings have little or no fishing activity creel clerks will move on to alternative sampling locations in close proximity.

The SFS uses a questionnaire and interview protocol similar to MRFSS/MRIP, with the same staff conducting both surveys since 2013. Data collected for the SFS questionnaire include:

1. Mode fished (i.e., private, charter, shore)

2. Specific body of water fished
3. Area fished (inshore, 0-3 miles, > 3 miles)
4. Utilization of artificial reef/reef name
5. Resident county of boat owner
6. Species targeted
7. Number of anglers participating on the vessel
8. Amount of time spent fishing for the trip
9. Expense of the trip (all anglers)
10. Angling trips the previous year, average of all anglers participating
11. Catch and disposition by species (includes both landed and released fish)
12. Length measurements obtained, with anglers permission, for retained species; 1988 – March 2009: length measurements mid-line length (ML); April 2009 – present: length measurements (TL)

Intercept data are coded and key entered into an existing Access database. Queries are used to look for and correct anomalous data and a component of the database records are checked against the raw intercept forms.

For the period January 1988 through February 2013, data are available from each month of the year. Beginning in 2013, SFS staff took on the duty of conducting the MRIP survey in SC and as a result the traditional SFS survey only operates during the months of January and February (no MRIP sampling during this period). Given this, traditional SFS data from March-December is generally included in MRIP landings reported for South Carolina since 2013.

The SFS collects information on both the nature of individual fishing trips and biological information on the species captured during the trip from cooperating anglers. Trip level information includes the date, location (intercept site, fishing location, and locale (estuarine, nearshore, offshore), fishing mode (private, shore, charter, etc.), purpose of the trip, target (primary and secondary) species, and angler information such as the number of anglers, hours fished, and average number of trips during the previous year across anglers in the party. Recorded biological information includes the species caught and the number and dispositions of caught fish. For those fish harvested, length information is verified for creel clerks and provide an analogous data set to that obtained from the harvested fish encountered by the MRFSS/MRIP APAIS. For released fish, the creel clerks obtain information on the number of legal sized fish released and the number of illegal (i.e., outside the slot limit for red drum) fish releases as well as obtain self-reported size information from the anglers on these released fish.

From 1988 through 2019 the SFS conducted 73,317 interviews, with red drum being caught in 8,575 interviews, or approximately 12% of all trips. These red drum positive trips reported the capture of 39,655 fish (landed and released), with 11,742 harvested and 27,913 released. The survey obtained length information from 11,426 fish (11,284 harvested fish; 178 released fish).

The nature of this survey suggests several potential uses in future red drum stock assessments, including as a fishery-dependent index of relative abundance or as a corroborative index for the MRIP index. Specifically, it provides the only source of information related to the harvest and relative abundance of red drum in South Carolina waters during wave 1. Three versions of a potential index presented during the simulation assessment process can be found in Figure 50. Further, due to the acquisition of length information, the survey could potentially be used as a data set to investigate recreational length compositions of anglers fishing in South Carolina, with potential uses being used to look at differences in the length composition of harvested and released fish (Figure 51) or temporal changes in the length composition of captured fish through time (Figure 52). A final use of this dataset could be to understand temporal changes in fisherman behavior relative to fishing practices, locations, within year timing of fishing, etc. which could become important to defining selectivity blocks. As illustrations of these potential uses, herein we include figures showing the number of red drum caught during different periods of the year (Figure 53), the number of positive trips during different periods of the year (Figure 54), and the number of red drum released during different periods (Figure 55).

Charterboat Logbook Program

The SCDNR issues licenses to charter vessels on a fiscal year (July 1 – June 30). In 1993, SCDNR's Marine Resources Division (MRD) initiated a mandatory trip-level logbook reporting system for all charter vessels to collect basic catch and effort data. Under state law, vessel owners/operators purchasing South Carolina Charter Vessel Licenses and carrying fishermen on a for-hire basis, are required to submit trip level reports of their fishing activity. Logbook reports are submitted to the SCDNR Fisheries Statistics section monthly either in person, by mail, fax, or scan and beginning in 2016, electronically through a web-based application. Reporting compliance is tracked by staff, and charter vessel owners/operators failing to submit reports can be charged with a misdemeanor. The charterboat logbook program is a complete census and should theoretically represent the total catch and effort of the charterboat trips in waters off of SC.

The charterboat logbook reports include: date, number of fishermen, fishing locale (inshore, 0-3 miles, >3 miles), fishing location (based on a 10x10 mile grid map), fishing method, hours fished, target species, depth range (minimum/maximum), catch (number of landed vs. released fish by species), and estimated landed pounds per vessel per trip. The logbook forms have remained similar throughout the program's existence with a few exceptions: in 1999 the logbook forms were altered to begin collecting the number of fish released alive and the number of fish released dead (prior to 1999 only the total numbers of fish released were recorded) and in 2008 additional fishing methods were added to the logbook forms, including cast, cast and bottom, and gig. Furthermore, the fishing method dive was added in 2012.

After being tracked for compliance, each charterboat logbook report is coded and entered, or uploaded into an existing database. Since the inception of the logbook program, a variety of staff have coded the charterboat logbook data. From ~1999 to 2006, only information that was explicitly filled out by the charterboat owners/operators on the logbook forms were coded and entered into the database. No efforts were made to fill in incomplete reports. From 2007 to present, staff have tried to fill in these data gaps through outreach with charterboat

owners/operators by making assumptions based on the submitted data (i.e., if a location description was given instead of a grid location – a grid location was determined; if fishing method was left blank – it was determined based on catch, etc.). From 1999 to 2006, each individual trip recorded was reviewed to look for anomalies in the data. Starting in 2007, queries were used to look for and correct anomalous data and staff began checking a component of the database records against the raw logbook reports. Coding and QA/QC measures prior to 1999 were likely similar to those used from 1999 to present, however, details on these procedures are not available since staff members working on this project prior to 1998 are no longer with SCDNR. Data are not validated in the field and currently no correction factors are used to account for reporting errors via paper submission; however, the online system is built with error messages and constraints to prevent common reporting mistakes and overlaps in the data. Recall periods for logbook records are typically one month or less. However, in the case of delinquent reports, recall periods could be up to several months. The electronic reporting application has already shown a decrease in recall bias.

Through 2019, the charterboat logbook program had logged 192,695 charterboat trips across South Carolina, with red drum being caught in 101,877 individual trips (~53% of all trips). The positive trips reported the capture of 762,553 fish, with 52,669 harvested and 709,884 released (Figure 56). Note, South Carolina charterboat owners/operators have developed a strong catch-and-release ethic for red drum (and other species) over time, with most captains either requiring or strongly suggesting catch and release for even legal-sized fish since the early 2000s. This has led to a reported release rate increasing from ~70% in the mid-1990s to >95% since the early 2000s across the South Carolina charterboat fleet (Figure 56).

As a census of the catch and effort of the South Carolina charterboat owners/operators, the SCDNR charterboat logbook program has several potential uses in future stock assessments of red drum, most importantly as a fishery-dependent index of red drum relative abundance (Figure 57) and as mechanism to understand temporal changes in fishermen behavior with regards to fishing practices, fishing locations, and within year timing of fishing activities. Cursory investigations of the charterboat logbook data suggests shifts in charterboat owner/operators behavior through time, with an increase in the rate of catch-and-release fishing practices (Figure 56) as well as a shift to more effort to nearshore waters (Figure 57, Figure 58, Figure 59, and Figure 60), which given red drum life history suggests increasing fishing pressure on the adult component of the red drum stock found along coastal South Carolina.

Georgia

In the fall of 1997, the Georgia Department of Natural Resources (DNR) initiated the Marine Sportfish Carcass Recovery Project. This project takes advantage of the fishing efforts of hundreds of anglers by turning filleted fish carcasses that anglers would normally discard into a source of much needed data on Georgia's marine sportfish. Chest freezers are placed near the fish cleaning stations at 20 locations along coastal Georgia. Each freezer is marked with an identifying sign and a list of target fish species. Cooperating anglers place the filleted carcasses, with head and tail intact, in a bag, drop in a completed angler information card, and then place the bag in the freezer. Each fish is identified to species, the fish length is measured, sex is determined when possible, and the otoliths are removed. A subsample of otoliths is aged annually. Each day is considered an independent sampling event. Red drum recovered through

this program are typically within the slot limit of 18”-26” and while samples mostly consist of 2 year old fish, both 1 year olds and 3 year olds are not uncommon.

The number of red drum collected by the Carcass Recovery Project ranged from 229 in 2006 to 1,336 in 2010 with an average of 608 fish collected each year. A total of 13,984 red drum have been processed by staff since the project began. These fish ranged in size from 225-950 mm FL with an average of 404 mm FL.

4.3 Tagging Programs

Virginia Game Fish Tagging Program

Since 1995, the Virginia Game Fish Tagging Program (VGFTP) has tagged recreationally important finfish with the help of volunteer anglers. A cooperative effort between the Marine Advisory Program at the Virginia Institute of Marine Science (VIMS) and Saltwater Tournament at the VMRC, the program’s funding is from state saltwater license funds and VIMS. Anglers utilize conventional and spinning rod and reel tackle, and artificial, live, and dead baits.

The number of cooperating anglers has changed from year to year and does not correlate with the number of fish that will be tagged each year. From 1995 through 2021, approximately 250 rotating anglers have tagged and released 64,871 red drum, peaking in 2012 with 18,461 tags. In recent years the number of red drum tags deployed by the VGFTP has decreased from a period of high volumes of tags between 2005 and 2013. Tag returns have remained mostly stable throughout the lifetime of the survey, with an average return of 9% in the first year, but spikes have occurred periodically, most recently in 2014, with 11% recaptured in the first year (341 fish recaptured out of 3,028 tagged fish).

Anglers in the program have tagged primarily sub-legal fish, with the average TL being 16.9”, below the 18”-26” slot limit in VA. Early in the program, larger fish were targeted to some degree, with the max recorded TL at 58”.

North Carolina

The NCDMF has conducted a tagging study on red drum since 1983. Tagging has been conducted using a variety of means and methods. The NCDMF has conducted directed and opportunistic tagging with trained NCDMF staff since 1983, in addition to trained anglers. During this period, anglers have tagged red drum primarily with large stainless-steel dart tags inserted in the muscle of the fish near the middle of the dorsal fin. Due to the large tag size, volunteer taggers were instructed to tag only large red drum (primarily greater than 685 mm TL) while NCDMF tagging efforts have focused on tagging sub-adult red drum (<685 mm TL) using primarily internal anchor belly tags.

The number of cooperating anglers has changed from year to year and does not correlate with the number of fish tagged each year. Over the entire time period, 71 taggers have participated in the red drum tagging program. Typically, most of the fish are tagged by a small subset of taggers who are commonly fishing guides. Prior to 2004, less than 15 anglers participated annually tagging approximately 600 fish per year. From 2004 to 2019, an average of 22 anglers tagged 1,064 red drum per year with a high of 1,742 tagged in 2006. Participation in the volunteer tagging program has declined in recent years with only 12 taggers tagging 245 red

drum in 2019. This decline in numbers tagged has been driven by some attrition of traditional high-volume taggers.

The angler tagging program combined with tagging from NCDMF staff has resulted in more than 80,000 red drum being tagged from 1983 to 2019. Since 1991, greater than 1000 red drum have been tagged annually. Volunteer anglers accounted for approximately 35,000 of these tagged fish. Volunteer angler tagged red drum averaged 910 mm FL at the time of tagging, with most ranging from 680-1180 mm FL. Division tagged red drum averaged 451 mm FL with most ranging from 240-620 mm FL. Over the time series, the return rate across tag types and taggers has been approximately 11%. Recapture rates vary based on size of fish at tagging and the tag type used. Larger fish tagged with stainless steel dart tags have an overall return rate of around 4% (recapture rates are similar for this tag type for both angler and NCDMF tagged fish) while sub-adults tagged with internal anchor tags see overall return rates of approximately 17%.

South Carolina

The SCDNR has a long history of supporting conventional tagging programs with the primary goal of providing a forum for angler outreach which provides a mechanism for developing a conscientious angling public who know and utilize best fishing practices. In addition, the conventional tagging program is a platform that can be used for the collection of valuable information on fish populations, including information on movement and migration, gear selectivities, and exploitation rates. To this end, SCDNR employs two complimentary tagging programs, the South Carolina Marine Game Fish Tagging Program (MGFT) and the Inshore Fisheries Fishery-Independent tagging program.

Marine Game Fish Tagging Program

The MGFTP began in 1974 and was the first state-sponsored public tagging program on the East Coast. The program was initiated with a small contribution from the Charleston-based South Carolina Saltwater Sportfishing Association. Today, the program receives funding from the U.S. Fish and Wildlife Service's Sport Fish Restoration Act and South Carolina Saltwater Recreational Fishing License Funds. The tagging program has proven to be a useful tool for promoting the conservation of marine game fish and increasing public resource awareness. In addition, the program has provided biologists with valuable data on movement and migration rates between stocks, growth rates, habitat utilization, and mortality associated with both fishing and natural events. The first red drum tagged via this program was released in 1978.

The MGFTP covers the entire coast of South Carolina. Most of the tag and recapture events occur inshore, but the program does collect data from nearshore and offshore sites. Data collected by the program includes tag number, date, species, length, length type, location, condition of fish upon release, and disposition of catch (in the case of a recapture).

The survey has directed its cooperative recreational anglers who are tagging red drum to target different size classes of red drum through time. From 1978-1992, anglers were encouraged to tag any size red drum encountered. Then, from 1993-2010, cooperative anglers were instructed to only tag red drum 18 inches TL or larger. In 2011, another guidance change occurred, with this guidance remaining in place until 2020. During this period, anglers were instructed to tag any fish less than 27 inches TL with a T-bar tag and any fish 27 inches TL and greater with a

nylon dart tag. A final guidance change occurred in 2020, when we began requesting anglers only tag red drum greater than 10 inches TL and that they only tag one red drum per "school" per day when fishing inshore waters. Similar to the 2011-2019 period, anglers tagged different sized red drum with different tags, using a t-bar tag when fish were less than 18 inches TL and a nylon dart tag when fish were 18 inches TL or greater.

Since its inception, the MGFTP has deployed 96,674 red drum tags and 14,807 recaptures have been reported. Of these recaptures, 73% were reported as being re-released. Peak red drum tag deployment occurred in 2017, 2018, and 2019 (4,596, 6,863 and 6,446 respectively). In more recent years, limitations were put on how many red drum a single volunteer could tag per day. This effort was put in place to allow for a greater number of program participants. A total of 4,985 tags were deployed during 2020 and 2021 combined.

Inshore Tagging Program

Since 1986, the Inshore Fisheries Research section of the SCDNR Marine Resources Research Institute (MRRI) have tagged red drum captured during research and survey sampling. As such, we have tagged most released red drum captured by our sub-adult (stop net, trammel net, and electrofishing surveys; 1986-present) and adult (historic and contemporary longline surveys; 1994-present) fishery-independent surveys. In addition, red drum have been tagged through a number of specific research projects (tag reporting rate studies; tagging of red drum outside of SC, etc.). For this program, fish are measured and tagged with either an internal anchor "belly" or stainless steel anchor "shoulder" dart tag, based on size, before being released at their site of capture (Figure 61). Released fish larger than 550 mm TL are tagged using the shoulder tag, with all released red drum between 350 and 550 mm TL tagged using the belly tag. Data collected at tagging include collection level information retained as part of the survey (e.g., water quality, location (site, stratum, latitude/longitude), date, etc.), fish length (nearest mm SL and TL), and disposition (released with tag). As all released red drum not previously recaptured greater than 350 mm TL are tagged, this program exhibits a spatial footprint as large as the widest footprint of our fishery-independent surveys, resulting in the tagging of red drum across all five South Carolina estuaries and in both estuarine and coastal waters.

Regardless of source, the desired information on angler recaptures of tagged fish remains the same. Anglers are asked to report their contact information (full name, mailing address, and telephone number), the species of fish caught, the tag number, the date and location of the recapture, and the length and disposition of the fish (was the fish retained or released, and if released, was the tag removed or left on the fish). Each angler is offered a reward of either a t-shirt, printed to commemorate their catch, or a cap, with an embroidered logo. For each recapture, a report is mailed to the angler with information on the fish that they caught, including when and where it was originally tagged and its length at that time, how long the fish was at large, a minimum distance it traveled, and any other recaptures that have been reported for the fish, including project recaptures that may have occurred during Inshore fishery-independent sampling. A cover letter is sent to each angler, with recent statistics on the numbers of fish tagged by the program and contact information for questions or reporting future recaptures.

Since its inception, the Inshore Tagging Program has tagged 75,413 red drum and obtained 31,699 red drum recaptures.

Combined SCDNR Tagging Program Data

Since 1978, across programs the SCDNR conventional tagging programs had tagged 172,087 red drum through 2019 (Figure 62), with 46,506 recaptures (Figure 63). Based on disposition, the conventional tagging data suggests catch-and-release rates of red drum in South Carolina has increased through time, with series lows in the late-1980s when the release rate was less than 25% to release rates in excess of 75% every year since 2000 (Figure 64).

Days at large of recaptures has varied greatly, from as short as the same day to as long as 8,403 days-at-liberty (Figure 65), with 11,576 recaptures of red drum at large at least 1 year since tagging (Table 20). The longest-at-liberty was a fish originally tagged via the SCDNR trammel net survey on 11/9/1992 when it was 580 mm TL. This individual was recaptured by an angler on 11/12/2015 in the Cooper River with a length of 1067 mm TL.

Based on location information, we can also infer information about minimum straight-line distance moved based on time-at-large for red drum based on this conventional tagging program (Figure 66). While the maximum minimum straight line distance moved was 467 km observed for a fish at-large for 739 days, only 28 fish moved >250 km with these 28 fish having days-at-large of 33-739 days. Only 0.6% of all recaptures (n = 272) occurred out of the state of South Carolina.

As part of the SCDNR tagging program, data is collected on the lengths of red drum encountered by recreational anglers across the state of South Carolina. This includes both the length at initial tagging (MGFTP only) and length at recapture by recreational anglers (MGFTP and FI tagging program). Coupled with disposition information (harvest vs. released), this provides a robust data set for investigation of harvest and release length compositions across coastal South Carolina. However, there are several caveats regarding the use of these data, including the self-reported nature of recreational length data and the non-equal distribution of lengths of tagged fish in the population.

Georgia

Georgia's Cooperative Angler Tagging (CAT) program began in 1987 and was created to involve anglers in tagging adult red drum as part of in-house research on the species. Tagging has proven to be a useful tool for promoting fish conservation as well as collecting valuable data on movement and migration, growth rates, habitat preference, and post-release survival. Partnering with recreational anglers is an efficient and cost-effective way for researchers to collect fisheries data and often creates a sense of ownership towards fisheries management decisions.

The number of cooperating anglers has changed from year to year and does not correlate with the number of fish that will be tagged each year. The number and species of fish tagged has varied over time as research objectives and staff have changed. From 1987 through 2020, approximately 200 cooperating anglers tagged and released over 9,000 red drum. In recent years the number of red drum tags deployed by the CAT has increased. Since 2017 4,635 tags

have been released, between 950-1,591 annually. Tag returns have also increased, with 507 total during the period.

Historically, cooperative tagging anglers have tended to tag larger red drum, with a bimodal distribution of fish at the upper end and above the slot. The addition of staff tagging in 2020 has improved our tag coverage of red drum below and at the lower end of the slot. The mean FL of red drum tagged by cooperative anglers was 493 mm, while the mean FL was 423 mm for staff tagging.

4.4 Total Fishery Removals

Northern stock fishery removals aggregated among all sources show a slight decline from the late 1980s through the 1990s followed by an increasing trend through the remainder of the time series (Figure 67). Total removals averaged 719,475 fish over the last 10 years, compared to an average of 230,964 fish during the 1990s. The recreational fishery has accounted for an increasing proportion of the removals through time, followed by the commercial GNBS fleet. The recreational fishery accounted for 92% of the total annual removals on average over the last ten years, while the commercial GNBS fleet accounted for 7%. Recreational dead discards have accounted for an increasing proportion of the total removals through time, averaging 37% of the total annual removals over the last ten years.

Southern stock fishery removals aggregated among all sources show a decline from high levels during the late 1980s, a slow and steady increase through the 2000s, and an increase at an accelerated rate in the 2010s (Figure 68). Total removals in recent years are similar to levels in the early to mid-1980s, averaging 2,149,442 fish from 2010-2019. Florida had generally accounted for the largest proportion of removals through time, followed by South Carolina, and Georgia. These contributions have been relatively consistent since 2000, averaging 21%, 18%, and 60% contributions, on average, by South Carolina, Georgia, and Florida, respectively. Recreational dead discards accounted for very small proportions of the total removals in the early 1980s (<3%), but accounted for an increasing proportion of total removals through the mid-2000s. Dead discards accounted for a relatively consistent proportion since 2005, averaging 28% of annual total removals.

5 FISHERY-INDEPENDENT DATA SOURCES

Eleven fishery-independent surveys have been used in past red drum stock assessments to provide indices of relative abundance. Three surveys monitoring the northern stock have been used including one indexing recruitment, one indexing primarily sub-adult abundance, and one indexing mature abundance. Eight surveys monitoring the southern stock have been used including three indexing recruitment, two indexing primarily sub-adult abundance, and three indexing mature abundance. One additional survey monitoring the southern stock, the South Carolina Rotenone Survey, was included in this assessment because it provides slightly different information than another survey already included, the South Carolina Stop Net Survey. The Rotenone Survey provides a measure of recruitment to the stock, whereas the Stop Net Survey provides a measure of later age-1 abundance throughout their first full calendar year of life (in addition to some older ages). These twelve surveys and indices generated from them were

selected to define index sampling specifications in simulations and are described below. The nomenclature included in parentheses next to each full survey name in the following section is used when referring to sampling specifications designed to mimic these surveys in the simulation process (Sections 6-8).

5.1 North Carolina Bag Seine Survey (NC_BagSeine)

5.1.1 Data Collection and Treatment

A red drum bag-seine survey offers complete survey coverage of 120 seine sets per year. Only in 1994 and 1999 did the number of seine sets fall below 100.

5.1.1.1 Survey Methods

The survey was conducted at 21 fixed sampling sites throughout coastal North Carolina (Figure 69) during September through November for each year from 1991 through 2019. Each of these sites was sampled in approximately two week intervals for a total of six samples with an 18.3 m (60 ft) x 1.8 m (6 ft) beach seine with 3.2 mm (1/8 in) mesh in the 1.8 m x 1.8 m bag. One "quarter sweep" pull was made at each location. This was done by stationing one end of the net onshore and stretching it perpendicularly as far out as water depth allowed. The deep end was brought ashore in the direction of the tide or current, resulting in the sweep of a quarter circle quadrant. Salinity (ppt), water temperature (^{o}C), tidal state or water level, and presence of aquatic vegetation were recorded. Locations of fixed stations were determined in 1990 based on previous catch rates and practicality for beach seining (Ross and Stevens 1992).

5.1.1.2 Biological Sampling

All red drum were identified, counted and measured to the nearest mm FL.

5.1.1.3 Catch Estimation Methods

The size distribution of red drum caught during this survey indicated most fish were age-0. Size cutoff for age-0 was 100mm and only age-0 fish were used in the index. The 100 mm cutoff was sufficiently bigger than the largest age-0 and smaller than any observed age-1 fish collected during the sample period.

The juvenile index is the arithmetic mean catch/seine haul of young-of-year (YOY) individuals.

5.1.2 Trends

Catch rates were variable early in the survey with apparent strong year classes in 1991, 1993, and 1997 (Table 21, Figure 70). During 1999-2001 there was a consistent series of low annual catch rates followed by an increase through 2005, before another decrease from 2006-2009. 2011 marked the 4th largest catch rate of the time series, indicating a strong year class. Since a recent low in 2013, values have been increasing and variable through 2019 with an apparent strong recent year class in 2018.

5.1.3 Potential Biases, Uncertainty, and Measures of Precision

The estimated standard errors for the arithmetic mean catch rates were largest for the peak catch rates during the 1990s and lower since then especially for the years of lower catch rates. Hurricanes during 1996 caused extreme high and low water conditions and may have altered survey results. For this reason, it was recommended that the 1996 data point be deleted from the index. The PSE (same as CV of the mean) indicate that the estimated arithmetic mean catch rates were at least as precise as other indices for YOY red drum in the southern stock, ranging from 14 to 31.

5.2 North Carolina Independent Gill Net Surveys (NC_GillNet)

5.2.1 Data Collection and Treatment

The North Carolina Sub-Adult Index occurs in Pamlico Sound and its tributaries. This is a stratified-random gill net survey designed to provide fishery-independent relative abundance indices for key estuarine species including red drum. Surveys in all regions use a stratified random design. Strata includes area and depth (greater or less than six feet).

5.2.1.1 Survey Methods

Sampling in Pamlico Sound (The Pamlico Sound Independent Gill Net Survey (PSIGNS)) was initiated in May of 2001. Sampling in the Rivers Independent Gill Net Survey (RIGNS) began in 2003 under the same sampling methodology. Since this time, both surveys have sampled continuously. Sampling locations are selected using a stratified random sampling design based on area and water depth (Figure 71). The PSIGNS was divided into eight areas: Hyde County 1 – 4 and Dare County 1 – 4. The RIGNS included dividing the Neuse River into four areas (Upper, Upper-Middle, Middle-Lower, Lower) and the Pamlico River into four areas (Upper, Middle, Lower and Pungo River). A one minute by one minute grid (i.e., one square nautical mile) was overlaid over all areas and each grid was classified into either shallow strata (< 6 ft), deep strata (≥ 6ft) or both based on bathymetric maps.

Each area was sampled twice a month. For each random grid selected, both a shallow and deep sample were collected. Sets in the Pamlico Sound were made over a part of the year in 2001 (237 sets), and thereafter was sampled between 300 and 320 sets per year. Sets in the Rivers (Pamlico, Pungo and Neuse) were made over a part of the year in 2003 (156 sets) and thereafter was sampled between 304 and 320 samples per year. Sample areas and coverage included in the PSIGNS and RIGNS surveys from 2001-2019 are provided in Figure 71.

For each grid selected, both the shallow and deep strata are sampled with a separate array (or gang) of nets. An array of nets consists of 30-yard segments of 3, 3½, 4, 4½, 5, 5½, 6, and 6½ in stretched mesh webbing (240 yards of gill net). Catches from this array of gill nets comprise a single sample, with two samples (one for the shallow strata, one for the deep strata) collected for each sampling trip. Gear was typically deployed within an hour of sunset and fished the following morning with effort made to keep all soak times within 12 hours. The 12-hour soak time allowed for uniform effort across all samples.

Physical and environmental conditions, including surface and bottom water temperature (°C), salinity (ppt), dissolved oxygen (mg/L), bottom composition, as well as, a qualitative assessment of sediment size, were recorded upon retrieval of the nets on each sampling trip. All attached submerged aquatic vegetation (SAV) in the immediate sample area was identified to species and density of coverage was estimated visually when possible. Additional habitat data recorded included distance from shore, presence or absence of sea grass or shell, and substrate type.

5.2.1.2 Biological Sampling Methods

Red drum for each mesh size (30-yard net) in a sample are enumerated with an aggregate weight (nearest 0.01 kg) obtained. Individuals were measured to the nearest millimeter for FL and TL.

Age data are available for each year and region from the survey. However, these data were not randomly collected but were taken as needed to provide representative samples by length bin during each monthly period sampled. Data should be valuable for growth curves and to inform model on the age of fish captured in the survey.

5.2.1.3 Catch Estimation Methods

The time series in the rivers differs from that in the Pamlico Sound, therefore the results have typically been analyzed separately for the two areas: 1) Hyde and Dare counties (PSIGNS) only, beginning 2001, and 2) Rivers (Pamlico, Pungo and Neuse; RIGNS), beginning 2003. The two regions can be combined as a single index beginning in 2003. The CPUE represents the number of red drum captured per sample and can be expressed overall or for fish assigned by the seasonal ALKs as an age-1 or age-2 index. A sample was one array of nets (shallow and deep combined) fished for 12 hours. Due to disproportionate sizes of each stratum and region, the final CPUE estimate is weighted. The total area of each region by stratum was quantified using the one-minute by one-minute grid system and then used to weight the observed catches for calculating the abundance indices.

In order to parse red drum into an aged-index, ages were assigned based on length cutoffs derived using seasonal ALKs (6-month: Jan-Jun, Jul-Dec). A large range of sizes were caught (range 220-1260 mm TL), but most sizes were associated with age-1 or age-2 fish (mean of ~400 mm TL). An overall age-aggregated index, as well as, an age specific index for age-1 and age-2 fish were generated.

5.2.2 Trends

The Pamlico Sound overall (age-aggregated) weighted CPUE showed a variable trend over the time series with the highest value occurring in 2013 (Table 22). This index was used in the simulation model tuning process (see Section 6.2.3) to incorporate the longer time series and all length and age data in the analyses. Age-1 fish varied throughout the time series with a time series high captured in 2012. Age-2 fish exhibited no clear overall trend with annual estimates being variable. Age-2 abundance peaked in 2013, corresponding with the peak in age-1 fish in 2012 and similarly peaked in 2017 following a peak in age-1 abundance from 2016.

Comparisons of the overall length composition and for the catch rates for age-1 and 2 were made between the Pamlico Sound and the shorter time-series Rivers portions of the survey (Figure 72 and Figure 73). Length compositions were similar between the two regions. Length compositions were most indicative of age-1 and age-2 fish with older fish less common in the survey. A second mode indicative of age-2 red drum was most commonly seen in the Pamlico Sound IGNS. Trends in age-1 fish were similar between those calculated from the Pamlico Sound and Rivers. Trends in age-2 abundance were similar, although age-2 fish were captured less frequently in the Rivers.

5.2.3 Potential Biases, Uncertainty, and Measures of Precision

The standard errors and PSEs are presented for the Pamlico Sound portion of the survey by age (age-1 and age-2) and for all ages aggregated (Table 22). Precision of calculated indices is good. The aggregated PSEs indicate the precision of this index is slightly less than the southern stock's Florida 183 Meter Haul Seine Survey (Section 5.12) and similar to the South Carolina Trammel Net Survey (Section 5.6). Precision decreased for age-specific indices and is higher for age-1 relative to age-2 fish.

5.3 North Carolina Adult Longline Survey (NC_Longline)

5.3.1 Data Collection and Treatment

The North Carolina Adult Longline Survey occurs in Pamlico Sound. This is a stratified-random survey designed to provide a fishery-independent relative abundance index for adult red drum in North Carolina. The survey has used continuous standardized sampling since 2007. Sampling intensity includes 72 stratified random sets per year taken over a 12 week period from mid-July to mid-October. All samples are taken with protocol for stratified random sample design.

5.3.1.1 Survey Methods

In order to begin a long-term index of abundance for adult red drum, this study employs a stratified-random sampling design based on area and time. Areas chosen for sampling were based on prior NCDMF mark and recapture studies, which indicate the occurrence of adult red drum within Pamlico Sound during the months of July through mid-October (Burdick et al. 2007; Bacheler et al. 2009). The sample area was overlaid with a one-minute by one-minute grid system (equivalent to one square nautical mile). Grids across the area were selected for inclusion in the sampling universe if they intercepted with the 1.8 m (6 ft) depth contour based on the use of bathymetric data from National Oceanic and Atmospheric Association (NOAA) navigational charts and field observations. Other factors, such as obstructions, accessibility, and logistics, were considered when grids were selected. Finally, the sample area was divided into twelve similarly sized regions (Figure 74). In order to stratify samples through space and time, two samples were collected from each of the twelve regions during each of three periods from mid-July to mid-October.

A standardized sampling protocol that is replicated each year has been consistently utilized in the survey since 2007. All sampling was conducted using bottom longline gear. Lines were set and retrieved using a hydraulic reel. Ground lines consisted of 227 kg (500 lb) test

monofilament. Samples were conducted with a 1,500-meter mainline with gangions placed at 15 meter intervals (100 hooks/set). Stop sleeves were placed at 30 m intervals in order to aid in accurate hook spacing and to prevent gangions from sliding down the ground line and becoming entangled when large species were encountered. Terminal gear was clip-on, monofilament gangions consisting of a 2.5 mm diameter stainless steel longline clip with a 4/0 swivel. Leaders on gangions were 0.7 m in length and consisted of 91 kg (200 lb) monofilament rigged with a 15/0 Mustad tuna circle hook. Hooks were baited with readily available baitfish (striped mullet is the primary bait and longline squid is the first alternative). Sets were anchored and buoyed at each end. Anchors consisted of a 3.3 kg window sash weight. Multiple sash weights were used in high current areas. All soak times were standardized and kept as close to 30 minutes as logistically possible. Soak times were measured from the last hook set to the first hook retrieved. Short soak times were designed to minimize bait loss, ensure that the red drum were tagged in good condition, and to minimize negative impacts to any endangered species interactions.

Within each randomly selected grid two samples are taken. In order to maintain consistency, all samples were made in the vicinity of the 1.8 m depth contour with sample depths typically ranging from 1.2 to 4.6 m in depth. All random sampling occurred during nighttime hours starting at sunset. On average, a total of four sets were made per night.

Physical and environmental conditions, including surface and bottom water temperature (^{o}C), salinity (ppt) and dissolved oxygen (mg/L), were recorded for each longline sample. Bottom composition and sediment size were recorded in the instances where they could be ascertained. Location of each sample was noted by recording the beginning and ending latitude and longitude.

5.3.1.2 Biological Sampling Methods

All individuals captured were processed at the species level and were measured to the nearest millimeter for either FL or TL according to the morphology of the species. Most red drum were tagged and released, but a random sample including approximately every fifth fish collected is sacrificed for biological data collection, including the removal of otoliths for ageing.

5.3.1.3 Catch Estimation Methods

Catch rates were calculated annually and expressed as an overall relative abundance index, along with corresponding length class distributions. The overall index is calculated as an arithmetic mean of the number of red drum captured per sample. Longline sets were standardized to 100 hooks set at 15 m intervals for 30 minutes (measured as time elapsed from last hook set to first hook fished).

5.3.2 Trends

The index of abundance from 2007 to 2018 varied annually with little trend (Table 23 and Figure 75). The index value for 2019 was the lowest in the time series. It should be noted that the survey in 2019 was disrupted significantly by hurricane activity that occurred during the peak of the sample period.

The lengths of red drum captured ranged from 64 to 126 cm FL with most being between 86 and 114 cm FL. Length composition was similar across years (Figure 76).

Red drum ages collected from the survey ranged from age 3 to age 43 (Figure 77). Aggregated ages across all years of the survey plotted by year class (cohort) show the persistence of strong year classes and weak year classes in the population over time (Figure 78). This trend appears consistent with variability in recruitment of YOY.

5.3.3 Potential Biases, Uncertainty, and Measures of Precision

Standard errors and variances are presented for the annual estimates of CPUE (Table 23). Apparent PSEs were relatively low, <20%, for most years. The survey time series is relatively short (13 years) given the longevity of red drum in the northern stock. The geographic range of the survey is limited to Pamlico Sound.

5.4 South Carolina Rotenone Survey (SC_Rotenone)

5.4.1 Data Collection and Treatment

In the mid-1980s the SCDNR began the development of a number of long-term fishery-independent monitoring programs designed to monitor estuarine and coastal finfish populations along coastal South Carolina. One of these surveys, the Inshore Fisheries Rotenone Survey was designed to provide a survey of the estuarine finfish inhabiting estuarine, sub-tidal saltmarsh creek habitats. These creeks are less than 5 m wide and less than 1 m deep an hour before low tide; these habitats dominate the coastal South Carolina marsh environment. The survey was designed to provide relative abundance indices for key estuarine species, including red drum, as the habitat sampled serves as a primary nursery habitat for a host of recreationally important estuarine species.

5.4.1.1 Survey Methods

Collections were made by blocking a 50 m long section of tidal creek with two 0.8 mm square mesh block nets, one at the upstream end of the section and one at the downstream end, about 1 hour before locally predicted time of low tide. The nets, with heavily weighted foot ropes, were suspended through the water column on lines stretched between poles sunk in the creek on opposite banks of the creek. Rotenone (100-200 ml of 5% Fish Tox, Wolfolk Chemical Works, Fort Valley, GA) was added at the upstream net and carried through the site with the ebbing current. At the down-stream net, potassium permanganate was added to the water leaving the site to oxidize the rotenone, thereby minimizing extra-site mortality. Immediately prior to the addition of rotenone, water temperature was measured with a stem thermometer and salinity was estimated with a refractometer. Dissolved oxygen was estimated with titration kit. Fishes were collected within the site with dip nets and 3 pulls of a 3.2 mm bar mesh seine. The down-stream net was then carefully collected and those fish caught in it were removed. All specimens were returned to the lab for identification, enumeration, and measurement.

The SCDNR rotenone survey employed a fixed station sampling design. From 1986 through 1988, 9 sites were sampled for a total of 97 samples (Table 24). Beginning in 1989 through the end of the survey in 1994, sampling was conducted at 4 index stations in the Wando River

Drainage, in Charleston County, SC: Deep Creek, Foster Creek, Lachicotte Creek, and PITA Creek (Table 24).

5.4.1.2 Biological Sampling

Given the nature of the sampling procedure (rotenone) all collected fish were sacrificed and many were returned to the lab for final enumeration and the collection of biological information. Biological information for red drum included TL, SL, and weights with age determined based on length of capture. Owing to the small size of red drum encountered in the survey, there is limited information on sex with all encountered fish being considered immature.

A summary of the length and weight information provided to the simulation assessment from the SCDNR rotenone survey is found in Table 32.

Most individuals were exclusively aged based on size alone, as the survey encounters red drum prior to significant overlap in length distribution of individual cohorts, with near 100% certainty in the age determination of calendar age-0, age-1, and 2 fish, as verified by otolith thin section methodology (Figure 87). During the history of the survey, only 1 fish >1 year old was encountered, indicating that this survey represents a survey of red drum recruitment.

A summary of the age information available from the rotenone survey and provided to the simulation assessment is found in Table 33.

5.4.1.3 Catch Estimation Methods

During SEDAR 44 the SCDNR rotenone survey was presented as an age-0 index using data from Sept-Dec and an age-1 index using data from Mar-Jul, with the latter being primarily considered. However, the survey in actuality represents recruitment of red drum and can be readily converted to a survey of red drum year class, noting that young of the year red drum first recruit to the survey shortly after being born during the fall and then persist in the survey through the winter, spring and summer of the following year as calendar age-1 fish (Figure 79). Under this treatment there is no need for the development of age or length compositions, as it is assumed to be a survey of recruitment with a sampling year of August-July.

5.4.2 Trends

The SCDNR rotenone survey indicates above survey average recruitment of red drum in 1986, 1990, and 1991 (Figure 80). In other years, the abundance of red drum in the survey was generally reduced.

5.4.3 Potential Biases, Uncertainty, and Measures of Precision

The SCDNR rotenone survey was a fixed station survey of one river drainage along coastal South Carolina. While not restricted to a single site, treatment of the data requires restricting data to the four core fixed stations sampled in the Wando River. Further, it is likely the index would benefit from index standardization to account for potential covariate effects on catchability due to environmental conditions such as month/day of year, water temperature, and salinity. Finally, the survey was of a relative short temporal duration, representing the catch of only

eight red drum year classes from 1985-1993. That said, the survey represents a true recruitment index and generally correlates well with other contemporary surveys operating at the same time with reasonable measures of precision while covering a temporal period not covered by most other surveys.

5.5 South Carolina Stop Net Survey (SC_StopNet)

5.5.1 Data Collection and Treatment

In the mid-1980s the SCDNR began the development of a number of long-term fishery-independent monitoring programs designed to monitor estuarine and coastal finfish populations along coastal South Carolina. One of these surveys, the Inshore Fisheries Stop Net Survey was designed to provide relative abundance indices for key estuarine species, including red drum, using salt marsh edge habitats. The survey indexed the relative abundance of numerous species and has been used in previous assessments of the southern population of red drum.

5.5.1.1 Survey Methods

The stop net was 366 m long by 3 m deep with a 51 mm stretch mesh block net made of multifilament nylon mesh. The net was set at high tide in an intertidal area. One end was attached to a stake driven into the marsh surface, and then the net was laid out from a boat over the non-vegetated bottom roughly parallel to the shore before securing the other end in the marsh with another stake. Upon deployment, the net enclosed a roughly semicircular area of approximately 12,000 square meters. Fishes trapped in the enclosed area were collected with large dip nets as the tide dropped and selected species, including red drum, were placed in oxygenated holding tanks and held until the water returned to the site and they could be measured, tagged, and released, or retained for life-history workup. Immediately after net deployment, water temperature was measured with a stem thermometer and salinity was estimated with a refractometer. Dissolved oxygen was estimated with a titration kit.

Stop net sampling took place from 1985 through 1998, but monthly survey sampling occurred at a single site in Charleston Harbor (site 0001) from the summer of 1986 through 1993, with most months sampled in 1994 (Table 25). A secondary site in northern Bulls Bay (site 0270) was sampled primarily during summers from 1990 through 1994, with a smattering of additional sites sampled throughout the survey history (Table 25).

5.5.1.2 Biological Sampling

Life history sampling of priority species, including red drum, was performed through the application of length distribution subsampling, with the number sacrificed for life history studies varying depending on species. Sacrificed red drum have several additional biological variables ascertained (e.g., weight (g) and macroscopic reproductive stage) and biological samples retained (e.g., otoliths for age and growth studies, scales for age and growth studies and ageing methodology comparisons, gonad tissues for histological determination of reproductive status, and muscle tissues for contaminant analysis).

A summary of the length and weight information provided to the simulation assessment from the SCDNR stop net survey is found in Table 32.

A combination of age methodologies was used to age red drum encountered by the SCDNR stop net survey, largely dependent on the size of the individual fish. Smaller individuals (<3 years old and approximately 500 mm TL), prior to significant overlap in length distribution of individual cohorts, can be reliably aged exclusively using TL, with near 100% certainty in the age determination of calendar age-1 and 2 fish, as verified by otolith thin-section methodology (Figure 87). The ages of larger, and hence generally older, individuals have been determined via a combination of scale readings and otolith thin-section techniques.

A summary of the age information available from the stop net survey and provided to the simulation assessment is found in Table 33.

5.5.1.3 Catch Estimation Methods

Annual length compositions for the survey were developed from the observed TL measurements made on all individuals encountered by the survey. There was no need for expansion of the length compositions given the survey sampling design.

Annual age compositions for the survey were not directly available, owing to the stratified random sampling design used to select fish to sacrifice for age determination via scales and otoliths. Thus, to develop annual age compositions we developed an all years pooled age-length key to convert the observed length composition to an age-composition. For a true assessment, additional work developing year and/or seasonal age-length keys would be conducted.

All years pooled length- and age-compositions can be found in Figure 81 and Figure 82, respectively. Modes in the pooled length composition reflect cohorts of red drum encountered by the survey, with the mode at <30 cm, 35-40 cm, and >55 cm corresponding to age-1, age-2, and age-3+ red drum encountered by the survey. When the length compositions are converted to age compositions based on a pooled age-length key, we see that the survey primarily encounters age-1 to age-4 individuals, which is to be expected based on the life history of red drum.

5.5.2 Trends

Overall, the SCDNR stop net survey shows a relatively stable abundance of sub-adult red drum along coastal South Carolina throughout the survey time series (Figure 83).

Annual length and age compositions available from the SCDNR stop net survey shows individual cohorts of red drum (identified by modes) being encountered by the survey (Figure 84 and Figure 85), with the peaks of the modes of the length compositions elucidating information on the formation of strong and weak year classes based on length alone (Figure 84). Similar signals of year class strength are seen in the annual age compositions (Figure 85).

5.5.3 Potential Biases, Uncertainty, and Measures of Precision

The SCDNR stop net survey represents a single fixed station along coastal South Carolina over a relatively short time period (9 years) limiting its utility as a coastwide index of relative abundance for the southern stock. In addition, there is relatively low sampling intensity within a

year at that fixed station, owing to the time required for a single collection. Combined, these attributes lead to higher than desired measures of precision on annual estimates of relative abundance. However, this survey is one of a select few that provides any information on the relative abundance of sub-adult red drum in the late-1980s and early 1990s.

5.6 South Carolina Trammel Net Survey (SC_Trammel)

5.6.1 Data Collection and Treatment

The SCDNR established the SCDNR trammel net survey in the fall of 1990 as a survey of lower estuary, generally moderate- to high-salinity, salt-marsh edge and oyster reef habitats; these habitats dominate the coastal South Carolina estuarine shoreline environment. The survey was designed to provide relative abundance indices for key estuarine species including red drum, as the habitat sampled serves as a primary habitat for a host of recreationally important estuarine species. The survey indexes the relative abundance of numerous species throughout the five major estuaries found along the South Carolina coast (Figure 86) and has been used in numerous stock assessments as an index of relative abundance, including previous assessments of the southern stock of red drum.

5.6.1.1 Survey Methods

The SCDNR trammel net survey employs a stratified random sampling design. On each sampling day (one stratum is sampled per day), trammel nets are typically set at 10-12 sites, although weather, tide, or other constraints sometimes hinders this target. Sites are selected at random (without replacement) from a pool of 27-55 possible sites per stratum, with the exception that adjacent sites (unless separated by a creek or other barrier) cannot be sampled on the same day to avoid sampling interference.

Fish are collected using a 183 x 2.1 m trammel net fitted with a polyfoam float line (12.7 mm diameter) and a lead core bottom line (22.7 kg). The netting comprises an inner panel (0.47 mm #177 monofilament; 63.5 mm stretch-mesh; height = 60 diagonal meshes) sandwiched between a pair of outer panels (0.9 mm #9 monofilament; 355.6 mm stretch-mesh; height = 8 diagonal meshes). The trammel net is set along the shoreline (10-20 m from an intertidal marsh flat, <2 m depth) during an ebbing tide using a fast-moving Florida net boat. Each end is anchored on the shore, or in shallow marsh. Once the net has been set, the boat makes two passes along the length of the enclosed water body at idle speed (taking <10 minutes), during which time the water surface is disturbed with wooden poles to promote fish entrapment. The net is then immediately retrieved and netted fish are removed from the webbing as they are brought on board and placed in a live-well. Once the net has been fully retrieved, all fish are identified to species and counted. Measurements (TL and SL) are taken from all individuals of target species (including red drum), and from up to 25 individuals of non-target species. Most fish (>95%) are released alive at the site of capture once length measurements are obtained. Any red drum greater than 350 mm TL released at the site of capture and not previously tagged are tagged, with tag type dependent on the size of the individual. Individuals between 350- and 549-mm TL are tagged with disc belly tags, and any greater than 549 mm TL are tagged with a steel shoulder tag.

Additional data collected during each collection includes location (site nested in stratum nested in area; latitude and longitude) and a suite of physical and environmental variables. Physical and environmental variables recorded include depth (m), air temperature (^{o}C), water temperature (^{o}C), salinity (PSU), dissolved oxygen (mg L^{-1}), and tidal stage.

At present, (2021), seven strata, from south to north, are surveyed: Port Royal Sound (PR), ACE Basin (AB), Ashley River (AR), Charleston Harbor (CH), Wando River (LW), Cape Romain (CR), and Winyah Bay (WB). These seven strata are found in the five primary South Carolina estuaries, Port Royal Sound (PR), St. Helena Sound (AB), Charleston Harbor (AR, CH, LW), Cape Romain and Bulls Bay (CR), and Winyah Bay (WB). Note however, the time series of sampling in each estuary has varied through time (Table 27). Limited historical data is also available from additional strata and areas within current strata but are generally excluded from the development of relative abundance indices due to temporal length of surveys in these areas.

From November 1990 to December 2019 (data considered during data workshop for index development), the SCDNR trammel net survey had made 24,754 collections along the South Carolina coastline, of which 23,696 were used in the construction of the red drum index of relative abundance (Table 30).

5.6.1.2 Biological Sampling Methods

Life history sampling of priority species, including red drum, is performed through the application of length distribution subsampling, with the number sacrificed for life histories studies varying depending on the species. Sacrificed red drum (~300-500 per year) have several additional biological variables ascertained (e.g., weight (g) and macroscopic reproductive stage) and biological samples retained (e.g., otoliths for age and growth studies, scales for age and growth studies and ageing methodology comparisons, gonad tissues for histological determination of reproductive status, and muscle tissues for contaminant analysis).

A summary of the length and weight information provided to the simulation assessment from the SCDNR trammel net survey is found in Table 32.

A combination of age methodologies is used to age red drum encountered by the SCDNR trammel net survey, largely dependent on the size of the individual fish. Smaller individuals (<3 years old and approximately 500 mm TL), prior to significant overlap in length distribution of individual cohorts, can be reliably aged exclusively using TL, with near 100% certainty in the age determination of calendar age-1 and 2 fish, as verified by otolith thin-section methodology. The ages of larger, and hence generally older, individuals have been determined via a combination of scale readings and otolith thin-section techniques.

A summary of the age information available from the trammel net survey and provided to the simulation assessment is found in Table 33.

5.6.1.3 Catch Estimation Methods

Arnott et al (2010) found that SCDNR trammel net CPUE of red drum is reasonably synchronous along the South Carolina coastline, justifying the pooling of individual stratum data for the development of a statewide relative abundance index. As length and age information is available from the survey for the development of length and age compositions, we treated the

trammel net survey as a length- (or age-) aggregated index of relative abundance. Herein only an arithmetic mean annual relative abundance was developed, as our primary interest in the simulation assessment was to capture the trends in relative abundance of red drum along the South Carolina coastline.

Annual length compositions for the survey were developed from the observed TL measurements made on all individuals encountered by the survey. There was no need for expansion of the length compositions given the survey sampling design.

Annual age compositions for the survey were not directly available, owing to the stratified random sampling design used to select fish to sacrifice fish for age determination via scales and otoliths. Thus, to develop annual age compositions we developed an all years pooled age-length key to convert the observed length composition to an age-composition. For a traditional benchmark assessment, additional work developing year and/or seasonal age-length keys would be conducted.

All years pooled length- and age-compositions can be found in Figure 88 and Figure 89, respectively. Modes in the pooled length composition reflect cohorts of red drum encountered by the survey, with the mode at <39 cm, 35-40 cm, and >55 cm corresponding to age-1, age-2, and age-3+ red drum encountered by the survey. When the length compositions are converted to age compositions based on a pooled age-length key, we see that the survey primarily encounters age-1 to age-4 individuals, which is to be expected based on the life history of red drum.

5.6.2 Trends

Overall, the SCDNR trammel net survey shows a decrease in abundance of sub-adult red drum along coastal South Carolina since the surveys inception, only briefly offset by a period of good recruitment in the early 2000s (Table 28 and Figure 90). Record low abundances have been observed in recent years.

Annual length compositions available from the SCDNR trammel net survey shows individual cohorts of red drum (identified by modes) being encountered by the survey, with the peaks of the modes elucidating information on the formation of strong and weak year classes (Figure 91). Evidence of the strong 2000-year class shows up in the 2001 length compositions, which seems to support a temporary increase in relative abundance across the state, as observed in the index (Figure 90). Unfortunately, length compositions have not been indicative of strong year classes occurring across coastal South Carolina over the past few years, as the apparent strong year classes based on proportion of fish encountered (e.g., 2016-2019) has not been maintained across years; length-compositions were dominated by small size classes, with those size classes not progressing to large sizes across years (Figure 91).

Not unsurprisingly, the age composition information supports the conclusions of the length compositions, with even stronger evidence for a shifting age structure and lack of strong recruitment in recent years (Figure 92). This is exemplified by the dominate age-classes in the survey being ages-2 and -3 through most of the 1990s and early 2000s, with the one exception being the strong 2000 year-class that first shows up in 2001. However, since the mid-2000s, the

age composition has been dominated most years by age-1 red drum, with once again little indication of a strong year class.

5.6.3 Potential Biases, Uncertainty, and Measures of Precision

Overall the SCDNR trammel net survey exhibits relatively low CVs, with an average CV of 0.12 (range: 0.08-0.22, Table 28). However, confidence in the index generally increases through time due to the expansion of the survey spatially leading to an overall increase in sampling intensity across the state. Further, the long time-series (29+ years) provides the most comprehensive insight into the long-term trends in sub-adult red drum populations along coastal South Carolina

5.7 South Carolina Historic Longline Survey (SC_Longline_historic)

5.7.1 Data Collection and Treatment

In an effort to monitor populations of adult red drum in South Carolina's estuarine and coastal ocean waters, a longline survey off of Charleston (Figure 94) was established in 1994. A primary focus of the survey was to develop an index of relative abundance of adult red drum to develop a better understanding of adult red drum populations along the southeastern Atlantic coast, thereby allowing for more effective and responsible management of the stock. As such, the survey collected data on the CPUE for indices of abundance and collected length measurements of all red drum encountered. Further, released red drum were tagged to collect migration and stock identification data.

5.7.1.1 Survey Methods

In the first year of the study, a cable mainline (1,829 meter long) with 120 hooks was deployed. Following discussion that sharks may be deterred by the cable (as sharks were also a target species), a 600-lb test, 1,829-meter monofilament mainline was also used with 120 hooks starting in 1995, and both gear types were used until 1997. In 1998, the survey switched to monofilament mainline for all sets, since it was concluded that while the cable gear decreased the catch of sharks, red drum catches were unaffected by the gear. Terminal tackle, regardless of mainline type, was composed of 0.5 m of 200 lb test monofilament, with a 2.5 mm stainless steel longline clip affixing it to the mainline and a 15/0 Mustad circle hook. The hooks were primarily baited with Atlantic mackerel and spot, with a 30 minute soak time (1st hook down to 1st hook up) employed, though the overall retrieval time for the gear varied depending on the catch.

The majority of effort took place at index stations in Charleston Harbor (across 7 main fixed stations at the Charleston jetties or nearshore habitats off Charleston Harbor with live bottom; Figure 94), with additional exploratory sets in Port Royal Sound in 2005 and in Winyah Bay and Port Royal Sound in 2006. Two vessels were used since the survey began, the *R/V Anita* (1994-2004) and the *R/V Silver Crescent* (2005-2006). The mile-long monofilament mainline was used until the survey design was modified in 2007 (with limited mile-long sets in 2007) from fixed sites to a stratified random design with 600-meter monofilament mainlines. Existing index

stations were broken into three 600 m sets, and new stations were added based on suitable habitat and previous exploratory sets (see Section 5.8 for full contemporary description).

Within a year, some sampling was conducted in each month of the year, though red drum catches were generally greater during the August-December period leading to a gradual increase in overall survey effort during this time frame. From 1994 to 2006, the SCDNR historic coastal longline survey made 1,168 collections that were used in the construction of the historic longline red drum index of relative abundance.

5.7.1.2 Biological Sampling

Each fish captured on the longline is brought on board, the hook is removed, and their length is measured to the nearest FL (i.e., mid-line length) and TL. At the conclusion of initial workup, each individual was generally tagged and released using three different tag types: nylon dart tag (1994-2006), PIT tag (2001-2006), and stainless steel dart tag (2001-2006). In addition, fin clips were taken from all encountered red drum from 2003-2006 and a limited number of fish were sacrificed for age and reproductive status determination.

5.7.1.3 Catch Estimation Methods

As length information is available from the survey for the development of length compositions and this survey is expected to capture adult red drum across a wide length range, we treated the historic SCDNR coastal longline survey as a length-aggregated index of relative abundance. Herein only an arithmetic mean annual relative abundance was developed, as our primary interest in the simulation assessment was to capture the trends in relative abundance of red drum along the South Carolina coastline. For a traditional benchmark stock assessment, the index could be standardized for the effect of collection level covariates measured at the time of each collection to account for effects of such covariates on catchability of adult red drum.

5.7.2 Trends

The SCDNR historic longline survey indicates a generally decreasing trend of adult red drum abundance from 1994-2000, followed by a short period of recovery from 2000-2003. This brief recovery period was followed by a steep decline in abundance from 2003-2006, with terminal year abundance approaching series lows seen in the mid- to late-1990s (Table 29 and Figure 95).

5.7.3 Potential Biases, Uncertainty, and Measures of Precision

Overall, the SCDNR historic coastal longline survey exhibits relatively low relative standard errors (RSE), with RSEs ranging from 0.10-0.24. Further, it represents the only source of historical information on the abundance of mature, adult fish. However the design of this survey (fixed station survey) and limited geographic scope (Charleston Harbor, SC, only) confounds the interpretation of relative abundance trends obtained from this survey. Further, there are potential sampling complications since the survey was modified from a survey designed to capture sharks initially. Though length information is available, the lack of age composition information from the survey may limit its ability to inform historic recruitment.

5.8 South Carolina Contemporary Longline Survey (SC_Longline_contemporary)

5.8.1 Data Collection and Treatment

In an effort to monitor populations of adult red drum in South Carolina's estuarine and coastal ocean waters, the SCDNR began sampling using longlines in Charleston Harbor in 1994. Though the contemporary SCDNR adult red drum and shark coastal longline survey (a.k.a. SCDNR longline survey) traces its roots to this original historic survey, the survey was less standardized in the early years and underwent a significant modification prior to the 2007 field season. In its contemporary form, the survey samples the mouths of four South Carolina estuaries, Port Royal Sound, St. Helena Sound, Charleston Harbor, and Winyah Bay, and nearshore live bottom habitat, with fixed stations found along the edge of deep channels and at known red drum aggregation sites (Figure 93). A primary focus of the survey is to develop an index of relative abundance of adult red drum to develop a better understanding of adult red drum populations along the southeastern Atlantic coast, thereby allowing for more effective and responsible management of the stock. Information from this survey has also been used for coastal shark assessments across the region.

The primary objectives of the survey are to conduct fishery-independent longline sampling on adult red drum and coastal sharks to generate information on CPUE for indices of abundance. The survey also collects biological information (size, sex, etc.) and samples (otoliths, gonads, muscle, fin clips, etc.) from random sub-samples of the red drum catch to determine size-at-age, recruitment to the spawning population, and genetic composition of the stock. Further, released adult red drum (and some sharks) are tagged to collect migration and stock identification data.

5.8.1.1 Survey Methods

With the 2007 field season, the SCDNR longline survey was redesigned to employ a stratified random sampling design. The survey samples four strata (Port Royal Sound, St. Helena Sound, Charleston Harbor, and Winyah Bay; Figure 93) during each of three six-week sampling periods (1 = Aug 1-Sept 15, 2 = Sept. 16-Oct 31, and 3 = Nov 1-Dec 15). The number of available stations for random selection per strata varies from 43-81: Port Royal Sound (78), St. Helena Sound (81), Charleston Harbor (43), and Winyah Bay (51). From this pool of stations, 30 are randomly selected for sampling from each stratum during each 6-week period, for an expected 120 collections per six-week sampling period and 360 collections per field season.

All sampling for the SCDNR longline survey has been conducted aboard the *R/V Silver Crescent* using standardized gear. Longline gear consists of a 272 kg monofilament mainline that was 610 m with weights (≥15 kg) and a 30.5 m buoy lines attached at each end. The mainline is equipped with stop sleeves every 30 m (21 line^{-1}) to prevent gangions from sliding together when a large fish is captured. The terminal tackle (gangions) is constructed of 0.5 m, 91 kg test monofilament leader, size 120 stainless steel longline snap, 4/0 swivel, and a 15/0 non-stainless-steel Mustad circle hook. Longlines were baited with Atlantic mackerel (*Scomber scombrus*), half Atlantic mackerel and half striped mullet (*Mugil cephalus*) for a bait study in Charleston Harbor (2011/2012), or all striped mullet, with 40 gangions placed on each mainline.

For each set, the station location (site nested in strata, latitude/longitude, and location (inshore vs. offshore) and gear code is recorded. When setting the gear, a start time (gear fully deployed) and end time (gear retrieval begins) of the set is noted for calculation of a set time (duration), in minutes. Gear was only set during daylight hours, and soak times for longline sets were limited to 45 minutes unless conditions or events dictated otherwise. A beginning and end depth is recorded at each station. Water quality (salinity (PSU), dissolved oxygen (mg L^{-1}), water temperature (^{o}C), tidal stage) and environmental conditions (air temperature (^{o}C), percent cloud cover, wind direction, and wind velocity) are recorded at the end of each set.

From 2007 to 2019 (data considered during data workshop for index development), the SCDNR coastal longline survey made 4,946 collections along the South Carolina coastline, of which 4,160 were used in the construction of the red drum index of relative abundance (Table 32).

5.8.1.2 Biological Sampling

Each fish captured on the longline is brought on board, the hook is removed, and their length is measured to the nearest mm. Red drum have both their FL and TL measured, are weighed to the nearest gram, and a fin tissue sample is retained for genetic analysis. At the conclusion of initial workup, each individual is either tagged and released or sacrificed for age estimation and reproductive assessment. Each red drum that is not sacrificed receive 2 tags unless previously tagged: a nylon dart tag (Hallprint©) inserted in the dorsal musculature near the mid-point of the second dorsal fin at an angle toward the head and embedded in between the pterigiophores, and a PIT tag, which is inserted in the dorsal musculature near the origin of the soft rayed dorsal fin (second dorsal).

Red drum sacrificed for additional life history studies were randomly selected, with every third fish encountered, up to a maximum of 10 fish daily, sacrificed. Sacrificed adult red drum (~100 per year) have several additional biological variables ascertained (macroscopic reproductive stage) and biological samples retained (e.g., otoliths for age and growth studies, gonad tissues for histological determination of reproductive status, and muscle tissues for contaminant analysis).

A summary of the biological information provided to the simulation assessment from the SCDNR longline survey is found in Table 32 and Table 33.

Red drum sacrificed for age from the SCDNR coastal longline survey have exclusively been aged via otolith thin-section techniques. A summary of the age information available from the trammel net survey and provided to the simulation assessment is found in Table 33.

5.8.1.3 Catch Estimation Methods

As length and age information is available from the survey for the development of length and age compositions and this survey is expected to capture adult red drum across a wide age range, we treated the coastal longline survey as a length- (or age-) aggregated index of relative abundance. Herein only an arithmetic mean annual relative abundance was developed, as our primary interest in the simulation assessment was to capture the trends in relative abundance of red drum along the South Carolina coastline. For a traditional benchmark stock assessment, the index would be standardized for a suite of covariates (e.g., stratum, water temperature,

salinity, DOY, etc.) collected at the time of sampling to account for effects of such covariates on catchability of adult red drum.

Three different measures of relative abundance, based on catch per 40 hooks, were developed and presented for consideration during the data workshop. These measures varied depending on the methodology used for correcting the effect different bait (Atlantic Mackerel versus Striped Mullet) had on apparent annual CPUE, with 1) no correction, 2) a correction used in SEDAR 44 (SEDAR 2015a), and 3) a correction used in South Carolina state-specific assessment (Murphy 2017) employed.

Annual length and age compositions for the survey were developed from the observed TL measurements made on all individuals encountered by the survey and the random sub-sample of sacrificed fish aged. There was no need for expansion of the length and age compositions to the total catch of the survey given the survey sampling design.

All years pooled length- and age-compositions can be found in Figure 96 and Figure 97, respectively.

5.8.2 Trends

Depending on the correction used, the overall trend suggests stable to slightly increasing adult red drum abundance along coastal South Carolina since 2007 (Table 31 and Figure 98).

Annual length- and age-compositions available from the SCDNR coastal longline survey have more difficulty tracking individual cohorts of red drum encountered by the survey, which is not surprising given the size range and age-classes of adult red drum this survey intercepts (Figure 99 and Figure 100). Concerning is the decrease in the relative proportion of older fish in the longline survey since the mid-2010s (Figure 100), particularly given the declining numbers of sub-adult red drum encountered by the SCDNR trammel net survey (Figure 90).

5.8.3 Potential Biases, Uncertainty, and Measures of Precision

Overall the SCDNR coastal longline survey exhibits relatively low CVs, with an average CV of 0.12 (range: 0.09-0.23, Table 31). However, less effort in the 2007-2009 sampling seasons translates to generally increased uncertainty during this time block. Further, the effect of bait type on the catchability of red drum introduces an additional source of uncertainty to annual estimates of relative abundance. As Atlantic mackerel was used exclusively in 2007-2009 and striped mullet from 2010-2019, this leads to some caution when interpreting the CPUE across these years. However, a bait study conducted in Charleston Harbor in 2011 and 2012 allows analysts to develop correction factors (SEDAR 2015a; Murphy 2017) to minimize the impact bait type has on annual CPUE. Further, this time series is growing in length, with the anticipation that the increased survey length will improve our understanding of abundance changes in the adult population that may manifest slowly as the survey integrates data over many age classes.

5.9 Georgia Gill Net Survey (GA_GillNet)

5.9.1 Data Collection and Treatment

To determine red drum relative abundance, the gill net survey was conducted in Altamaha and Wassaw Sounds (Figure 101) from June through August 2003-2019.

5.9.1.1 Survey Methods

In the Altamaha River Region (Figure 102), 36 stations were sampled each month from a pool of 60 total stations using a stratified random station design. In a given survey month, each selected station is sampled one time. In Wassaw Sound (Figure 103), 36 stations were selected and sampled from a pool of 70 total stations using a stratified random station design.

A minimum of 36 stations are sampled in each sound system during each month of the sampling season (June – August). The time series covers 2003-present. The number of sites visited each year are outlined in Table 34.

In a given survey month, each selected station is sampled one time.

All sampling occurred during the last three hours of ebb tide and only during daylight hours. Station pools in both survey areas were determined by initial surveys, which identified locations that could be effectively sampled with survey gear.

Survey gear is a single panel gillnet. The net is 91.4 m (300 ft.) long by 2.7 m (9 ft.) deep. The panel has 6.4 cm (2.5 in.) stretch mesh. The net has a 1.3 cm (0.5 in.) diameter float rope and a 34 kg (75 lb.) lead line. A 11.3 kg (25 lb.) anchor chain is attached to each end of the lead line, and a large orange bullet float is attached to each end of the float line.

A sampling event consists of a single net set. The net is deployed by boat starting at the bank following a semicircular path and ending back on the same bank. Net deployment is performed against the tidal current. Immediately after deployment, the net is actively fished by making two to three passes with the boat in the area enclosed by the net. After the last pass is made, the net is retrieved starting with the end that was first set out. As the net is retrieved, catch is removed and put inside a holding pen tied to the side of the boat. After the net is fully retrieved, all catch is processed for information and released. The catch is identified to species and counted. In addition to catch information, temporal, spatial, weather, hydrographic and physio-chemical data are collected during each sampling event.

5.9.1.2 Biological Sampling

All finfish specimens are measured, centerline in millimeters.

5.9.1.3 Catch Estimation Methods

Catches of target species were first separated into age cohorts by applying a standard monthly cutoff value to the length frequency information collected with each catch. Cutoff values vary among months for each species and were based on modal analyses of historical composite monthly length frequency data and reviews of ageing studies for each species. For the earlier months of the year, cutoff values were arbitrary values that fell in between discrete modal size ranges. In the later part of the year, when early spawned, rapidly growing individuals of the

most recent year class may overtake late spawned and slowly growing individuals of the previous year class, cutoff values were selected to preserve the correct numeric proportionality between year classes despite the misclassification of individuals.

The extent of the zone of overlapping lengths and the proportion within that range attributable to each year class is estimated based on the shape of each modal curve during the months prior to overlap occurring. A length value is then selected from within that range which will result in the appropriate proportional separation. In the case of red drum, specimens collected during the survey most often represented age-1 fish, with 97% of all fish captured falling in the 220 to 350 mm range. Although this process involved considerable subjectivity and ignored possible interannual variability in average growth rates, there was little likelihood that any significant error was introduced as only a very small fraction of the specific aged cohort individuals fell within the zone of overlap. Most of the data used to construct juvenile indices were drawn from months when no overlap at all is present.

Given the short sampling period of the gillnet sampling (June-August), and trammel sampling (September-November) all three months in each survey were used in these estimates. After partitioning out age-specific cohort individuals, numbers of individuals caught were logarithmically transformed (ln(n+1)) prior to abundance calculations, as this transformation has repeatedly been shown to best normalize collection data for aggregative organisms such as fishes. Annual juvenile CPUE indices were calculated as the weighted geometric mean catch per net set. Strata-specific means and variances were calculated and then combined, weighted by stratum areas according to the formulae supplied by Cochran (1977). Since stratum areas are quite variable, use of a weighted mean provided an index that more closely mirrors actual population sizes than a simple mean. Resulting average catch rates (and the 95% confidence intervals as estimated by + 2 standard errors) are then back-transformed to the weighted geometric means. CV is expressed as the log transformed mean catch divided by the standard deviation, E(Yst) / STD (Cochran 1977).

5.9.2 Trends

CPUE by year for 2003 through 2019 are provided in Table 34and Figure 104. Since 2009, CPUE has varied widely for red drum in the gill net survey ranging from a survey low of 0.41 in 2012 to a survey high of 1.55 in 2010. The Altamaha River system and Wassaw Sound have traditionally shown similar trends through the years. However, survey data differed greatly in 2018 and 2019. One thing to keep in mind is that the gill net survey is designed to target juvenile red drum, the average size of fish caught in the survey is 282 mm FL. Essentially this survey is a measure of annual recruitment and is largely driven by spawning success and environmental effects on larval/juvenile fish survivability through the winter/spring. The index generally tracks well with annual MRIP estimates.

5.9.3 Potential Biases, Uncertainty, and Measures of Precision

Overall, the GA gillnet survey is a robust long-term standardized survey, designed specifically to target YOY red drum before they enter the fishery. The survey has been in continuous operation since 2003 and the survey design has remained relatively unchanged since its inception. Geographically the survey has historically included two primary regions (Wassaw and

Altamaha). Recognizing that this could lead to an underrepresentation of statewide red drum trends, a third system (St. Andrew) was added in 2019. Data from the St. Andrew expansion is still preliminary and has not yet been included in the survey index. However, the addition of St. Andrew and any other future expansions should help improve statewide status estimates.

5.10 Georgia Longline Survey (GA_Longline)

5.10.1 Data Collection and Treatment

The GADNR utilizes a near shore red drum bottom longline survey which encompasses state and federal waters off the coast of Georgia. This is a stratified-random study to develop fishery-independent indices of abundance for multiple shark species and adult red drum occurring in state waters. Data gathered from this study will be used to support long-term fishery-independent indices for the Southeast (North Carolina – Florida) that can be used in future stock assessment work. Tagging of red drum and sharks captured during the study will allow for additional information on migratory behavior and stock identification.

5.10.1.1 Survey Methods

Current sampling occurs in waters of Doboy Sound to St. Mary's in Georgia from June to December. Stations are randomly chosen from a subset of sites identified as areas with high encounter probabilities. Three strata are delineated off Georgia (inshore; near shore; offshore) and sampling efforts are proportionally allocated to match the emigration pattern of adult red drum. All stations are sampled during daylight hours and are generally located in water depths between 13 and 65 feet. The longline is deployed from the R/V Marguerite, a 47’ offshore vessel. The mainline is made of 600 lb. monofilament and is approx. ½ nautical mile in length. A total of 60 droplines are attached to the mainline, where each dropline consists of a longline snap, 1.5 ft of 200 lb. monofilament, and a 12/0 circle hook on the terminal end. Hooks are not offset and have barbs depressed. The total soak time is 30 minutes with hooks baited with mullet.

Beginning in 2018, sampling was broken up into 4, 6-week quarters. A minimum of 35 bottom-set longline stations are selected to be sampled in Georgia coastal waters each 6-week quarter (June 16-July 31, Aug 1-Sep 15, Sep 16 – Oct 31, Nov 1 – Dec 15).

Since its inception in 2006, the longline survey has captured nearly 900 large, adult red drum.

5.10.1.2 Biological Sampling

All catch is processed at the species level. All red drum are landed and processed for standard morphometrics and genetic material (fin clip) when requested. Viable red drum are tagged with conventional dart and PIT tags and released. Mortalities are processed further for sex and gonadal development information, and otoliths are extracted for age determination. Periodically, a subsample of red drum may be sacrificed to estimate the adult stock age composition.

5.10.1.3 Catch Estimation Methods

CPUE is based on the arithmetic mean of catch per 60 hooks. This measure is intended to capture annual trends of relative abundance of red drum along the Georgia coast.

5.10.2 Trends

The index has been variable with some higher values in recent years (Table 35 and Figure 105). The longline survey is still adapting due to low numbers of captured red drum per year.

The length frequency of red drum caught during the survey is in Figure 106.

5.10.3 Potential Biases, Uncertainty, and Measures of Precision

In the early years of the survey different hook sizes and bait types were tested. In 2006 and 2007 mackerel and squid were the primary bait types. From 2008-2015 mullet and squid were tested. Beginning in 2021 the survey was tuned to replicate the South Carolina longline survey which included standardized hook size and bait selection to include mullet only.

5.11 Florida 21.3 Meter Haul Seine Survey (FL_21.3_HaulSeine)

5.11.1 Data Collection and Treatment

Indices of relative abundance for red drum were derived from surveys conducted by the Florida Fish and Wildlife Research Institute's Fishery Independent Monitoring (FIM) program in northeast Florida (lower St. Johns, Nassau, and St. Mary's River basins) as well as the northern portion of the Indian River Lagoon.

The 21.3-m center bag seine was used to develop an index of relative abundance for age-0 YOY red drum.

5.11.1.1 Survey Methods

The FIM program uses a stratified random sampling design to monitor abundances of fish and invertebrates. Survey areas were divided into sampling zones based upon geographic and logistical criteria where each zone was further subdivided into 1-nm^2 grids and randomly selected for sampling. Sampling grids were stratified for each gear type by depth and habitat (defined by shore type [overhanging or not] and bottom vegetation [vegetated or not]) where a single sample was collected at each randomly selected site in shallow water ≤1.8 m. Environmental data consisting of water chemistry, habitat characteristics, and current and tidal conditions were recorded for each sample. In northeast Florida, sampling has been conducted year round since May 2001 and since late 1997 in the northern Indian River Lagoon.

5.11.1.2 Biological Sampling

All captured red drum were counted and a random sample of at least 20 individuals were measured (SL). If more than 20 red drum were encountered, then length frequencies of the 20 fish were expanded to the total number caught to estimate the sample catch length frequency.

5.11.1.3 Catch Estimation Methods

YOY were defined as red drum captured during the peak recruitment season of September through March and whose lengths were smaller than or equal to 40 mm SL. Cohorts were kept together such that fish caught in September through December were grouped with those caught January through March the following year. Prior to standardization, the data were subset to remove any months, zones, or strata that rarely encountered red drum.

Catch rates for this index were standardized using the delta lognormal model which split the process into two generalized linear submodels (Lo et al. 1992). The first submodel estimated the proportion of stations where red drum were observed. This submodel used a binomial distribution with a logit link. A separate submodel with a gamma distribution and a log link was used to estimate the mean number of red drum caught at positive stations. The estimated coefficients were then back-calculated from their linearized form used in the modeling steps. The annual index is the product of the proportion of samples where red drum were observed and the mean number of red drum by year estimated from the positive model.

Potential explanatory variables included year, month, bottom vegetation, bottom type, shore type, bay zone, water temperature (°C), dissolved oxygen (mg/L), and salinity (ppt). All potential explanatory variables were treated as categorical variables partially to account for non-linearity. Beginning with the null model, forward stepwise selection was used to identify which variables should be included in the final versions of the submodels. To be included in the final submodel, variables had to meet two criteria: the variable must be statistically significant at an alpha level of 0.05 and its inclusion must reduce deviance (a measure of the variability) by at least 0.5%.

5.11.2 Trends

The YOY index of relative abundance for red drum increased in trend between 1998 – 2005, then decreased and became variable but stable through 2019 (Table 36 and Figure 107). Stronger year-classes occurred from 2003 – 2005, with the strongest occurring in 2005 while weaker year-classes have occurred recently in 2018 – 2019.

5.11.3 Potential Biases, Uncertainty, and Measures of Precision

To estimate variability in the annual index values (Table 36), a Monte Carlo simulation approach was used with 10,000 iterations using the least-squares mean estimates and their standard errors from the two generalized linear submodels. Each iteration used the annual least-squares mean estimate on the log scale and uncertainty was added by multiplying the annual least-squares mean estimate's standard error by a random normal deviate ($\mu=0$, $s=1$). These values were transformed back from their linear scales prior to being multiplied together and the index derived was the product of the probability of observing a red drum during sampling and the annual average number of red drum counted at sites where this species was encountered.

5.12 Florida 183 Meter Haul Seine Survey (FL_183_HaulSeine)

5.12.1 Data Collection and Treatment

Indices of relative abundance for red drum were derived from surveys conducted by the Florida Fish and Wildlife Research Institute's Fishery Independent Monitoring (FIM) program in northeast Florida (lower St. Johns, Nassau, and St. Mary's River basins) as well as the northern and southern portions of the Indian River Lagoon.

The 183-m haul seine was used to develop an index of relative abundance for sub-adult red drum.

5.12.1.1 Survey Methods

The FIM program uses a stratified random sampling design to monitor abundances of fish and invertebrates. Survey areas were divided into sampling zones based upon geographic and logistical criteria where each zone was further subdivided into 1-nm^2 grids and randomly selected for sampling. Sampling grids were stratified for each gear type by depth and habitat (defined by shore type [overhanging or not] and bottom vegetation [vegetated or not]) where a single sample was collected at each randomly selected site in shallow water ≤1.8 m.

Environmental data consisting of water chemistry, habitat characteristics, and current and tidal conditions were recorded for each sample. In northeast Florida, sampling has been conducted year round since May 2001 and since 1997 in the northern and southern portions of the Indian River Lagoon.

5.12.1.2 Biological Sampling

All captured red drum were counted and measured (SL). If five or fewer were captured within a single set, they were culled for further biological sampling including weight, sex, maturity, age, mercury content, and diet.

Red drum culled for further biological sampling had their otoliths removed and aged by FWRI's Age and Growth lab.

5.12.1.3 Catch Estimation Methods

Sub-adults were defined as red drum captured year round whose lengths were larger than 300 mm SL. Prior to standardization, the data were subset to remove any months, zones, or strata that rarely encountered red drum.

Catch rates for this index were similarly standardized as the 21.3-m seine index using the delta lognormal model which split the process into two generalized linear submodels (Lo et al. 1992). The first submodel estimated the proportion of stations where red drum were observed. This submodel used a binomial distribution with a logit link. A separate submodel with a gamma distribution and a log link was used to estimate the mean number of red drum caught at positive stations. The estimated coefficients were then back-calculated from their linearized form used in the modeling steps. The annual index is the product of the proportion of samples where red drum were observed and the mean number of red drum by year estimated from the positive model.

Potential explanatory variables included year, month, bottom vegetation, bottom type, shore type, bay zone, water temperature (°C), dissolved oxygen (mg/L), and salinity (ppt). All potential explanatory variables were treated as categorical variables partially to account for non-linearity. Beginning with the null model, forward stepwise selection was used to identify which variables should be included in the final versions of the submodels. To be included in the final submodel, variables had to meet two criteria: the variable must be statistically significant at an alpha level of 0.05 and its inclusion must reduce deviance (a measure of the variability) by at least 0.5%.

5.12.2 Trends

The sub-adult index of relative abundance for red drum has been variable without trend from 1997 – 2015, then declined through 2019 with low abundances in the terminal 3 years of the time series (Table 37 and Figure 108).

The survey mostly encountered red drum less than 65 cm (Figure 109) and ages 1-3 (Figure 110).

5.12.3 Potential Biases, Uncertainty, and Measures of Precision

To estimate variability in the annual index values (Table 37), a Monte Carlo simulation approach was used with 10,000 iterations using the least-squares mean estimates and their standard errors from the two generalized linear submodels. Each iteration used the annual least-squares mean estimate on the log scale and uncertainty was added by multiplying the annual least-squares mean estimate's standard error by a random normal deviate ($\mu=0$, $s=1$). These values were transformed back from their linear scales prior to being multiplied together and the index derived was the product of the probability of observing a red drum during sampling and the annual average number of red drum counted at sites where this species was encountered.

6 METHODS

6.1 Description of Simulation Process

The simulation process used in this assessment consisted of several steps. The first step was the data simulation process, where observed data from *in situ* monitoring programs covered in Sections 4 and 5, acquired through the data workshop, were used to construct simulated populations of the northern and southern red drum stocks. The operating models (OMs) used to create these simulations were based in Stock Synthesis (Section 6.2). Simulated sampling datasets were then sampled from simulated stocks with the OM and passed to each of the estimation models (EMs) being considered as candidates for future red drum stock assessment models.

The performance of three candidate assessment models was evaluated in this study. These three models were: a traffic light analysis (TLA) of model-free stock indicators, used previously for Atlantic croaker and spot management advice; the Statistical Catch-at-Age assessment models (SCA) used for the most recent red drum benchmark stock assessment in 2017; and a Stock Synthesis model (SS), widely used in stock assessments. The frameworks varied in their

degree of complexity and ability to assess and predict population trends. While technically SS is a statistical-catch-at-age model, it is a more flexible environment that can incorporate a wider assortment of data inputs and parameter estimates than the SCA. Further details about each model are provided in Section 6.3.

The assessment evaluation followed a structured path to evaluate the performance of each EM (Figure 111) for a range of scenarios (Section 6.1.1). The first step was to ensure that each of the methods could successfully converge and produce valid results. Next, the individual results for each of the assessment frameworks were compared, when possible. These comparisons focused on two broad fishery characteristics, fishing mortality and abundance/biomass, selected based on their importance to management and their ability to be estimated by the models. For each of the broad fishery characteristics, there were numerous fishing mortality (Table 40) and abundance/biomass (Table 41) population parameters used in performance metrics (relative error, Type I and Type II error rates) to evaluate performance of candidate red drum stock assessment approaches. While it was preferred that these population parameters could apply to all assessment approaches, due to differences in model configurations, especially the TLA, estimates could not be produced for each parameter for all approaches.

Biological reference points were selected to evaluate model performance when determining stock status. The ASMFC (2002) defines the overfishing threshold for red drum to be 30% SPR and a management goal (fishing target) of 40% SPR. SPR is calculated as the spawning stock biomass per recruit expected under the current year's fishing regime divided by the theoretical spawning stock biomass under no fishing. This was calculated as:

$$sSPR_y = \frac{\sum_a Mat_a B_a \prod_1^a e^{-Ma-F_{y,a}}}{\sum_a Mat_a B_a \prod_1^a e^{-Ma}},$$

where $\boldsymbol{Mat_a}$ and $\boldsymbol{B_a}$ are the maturity- and weight-at-age vectors through the maximum ages (62 years in north and 41 years in south), respectively.

The $SPR_{30\%}$ benchmark is the basis of several other benchmarks used in performance evaluations: ($R_{30\%}$, $F_{30\%}$, $SSB_{30\%}$). The $F_{30\%}$ benchmark is the level of fishing mortality that achieves $SPR_{30\%}$. The $R_{30\%}$ and $SSB_{30\%}$ benchmarks are the levels of these respective parameters when the stock is fished at $F_{30\%}$ according to the specified stock-recruit relationship for the simulated stocks. Due to the noisiness of the data and the general imprecision of red drum fishing mortality estimates, the reviewers in SEDAR 18 recommended using a three year average SPR for management of red drum (Section 1.3.1) and so these parameters were included with the annual estimates in performance evaluations.

The performance evaluation also included escapement (Esc), a more readily "observable" metric for red drum that is very similar to SPR when there are low levels of fishing mortality on mature adults. Past assessments (Vaughan and Carmichael 2000) presented estimates of escapement to age-4. During SEDAR 18, it was determined that it may be useful to encompass more of the immature portion of the stock in the escapement estimate, so escapement estimates to age-6 are also presented in this assessment. If there was no fishing mortality on mature adults then escapement would equal SPR levels. Static, or year specific, escapement was defined as:

$$Esc_y = e^{\sum_{a=1}^{T} -F_{y,a}},$$

where ***T*** is either age-3 (escapement through age-3 or to age-4) or age-5 (escapement through age-5 or to age-6).

The assessment approaches were evaluated based on their performance estimating population parameters through multiple iterations of each simulation scenario. Assessment model estimates were compared to the known population parameters of the OM to calculate performance metrics, and these performance metrics were then compared to those of the other assessment models to evaluate relative performance across assessment models. Evaluation of performance was both qualitative and quantitative.

The first evaluation criterion was the ability of a given model to successfully run an iteration of a scenario and converge on a solution (only applies to SCA and SS EMs). Models may have varying amounts of difficulty running scenarios depending on specification and convergence rates across all iterations (n converged iterations/n iterations) provides information on the stability of the estimation model.

If a model successfully ran an iteration, performance was then evaluated on how each approach estimated the status/condition and the precision and accuracy of parameters (Figure 111). For status/condition, Type I and Type II error rates were the metrics of interest. Type I error (false positive) was defined here as incorrect rejection of a null hypothesis of favorable condition/status (e.g., stock was estimated to be in poor condition when it was really in good condition), while Type II error (false negative) was the incorrect rejection of a null hypothesis of unfavorable condition/status (e.g., stock was estimated to be in good condition when it was really in poor condition). Error rates were quantified by their frequency of occurrence across iterations for a given model and scenario.

Relative error was used to assess precision and bias of quantitative population parameter estimates for each model. Relative error was used quantitatively to examine the magnitude and direction of error for individual parameter estimates. The main parameters of interest were recruitment (R), fishing mortality (F), sub-adult abundance (SN; sum of age2 and age-3 abundance), and mature stock abundance or biomass (MN or SSB). Two $SPR/SPR_{30\%}$ and $F/F_{30\%}$ were assessed, one using annual values (i.e., SPR_y, F_y) and one using running three-year average values (i.e., $\boldsymbol{SPR}_{y-2,y-1,y}$, $\boldsymbol{F}_{y-2,y-1,y}$). Relative error was calculated using the formula:

$$\frac{Estmated\ value - True\ value}{True\ value}$$

Estimation model performance was initially evaluated by plotting performance metrics across iterations for the simulation scenarios. Type I and Type II error rates and the distribution of relative error were plotted to examine performance over the complete time series of model estimates for individual parameter estimates and results for different candidate models were plotted against each other. This initial visualization of error patterns for model outputs provided more detail about the characteristics of uncertainty for model estimates than were provided by more summarized performance metric results.

No prescriptive scoring system was used to select the best performing assessment model overall for a given scenario, but performance metrics were further summarized and compared in decision tables to guide future modeling recommendations (see Section 7.2.1).

6.1.1 Scenarios

Simulation scenarios to be addressed in the assessment were identified at the beginning of the assessment and prioritized by the SAS. Simulation scenarios were grouped into two types: core population dynamics scenarios and data prioritization scenarios. The goal of the core population dynamics scenarios was to evaluate candidate assessment approaches for assessing red drum stocks with status quo monitoring under various scenarios that may play out in future red drum stock assessments. The data prioritization scenarios were designed to evaluate improvements in modeling performance with changes to status quo monitoring. The goal of these data prioritization scenarios was to inform research recommendations for future monitoring of red drum stocks. Scenarios were run by each candidate model, for each red drum stock, and the results evaluated. General descriptions and purpose for selected scenarios are described below and in Table 42, and additional details about the parameterizations of these scenarios in the OMs are provided in Section 6.2.5. A full table of all scenario runs performed in the assessment, including supplemental scenarios identified during development of EMs (see Section 7.1) and following review of the core population dynamics scenarios (see Section 7.3), are described in Table 43.

6.1.1.1 Core Population Dynamics Scenarios

Decreasing Fishing Mortality (***Base***) – This scenario was selected as a proxy for a recovering stock. This scenario was selected as the ***Base*** scenario because it included the most likely fishing mortality trajectory, as it is unlikely that fishing mortality would remain high (as in the ***High F*** scenario below) without being addressed by management changes. Fishing mortality was simulated to increase gradually for a period of time (fifteen years) to high levels corresponding with SPR values around ≈15%, on average, followed by a decreasing trend for a period of time (five years) to levels corresponding with SPR values ≈45%, on average, before stabilizing at these values. The shorter period for decreasing fishing mortality was selected to simulate implementation of regulations in response to the increased fishing mortality levels.

High Fishing Mortality (***High F***) – This scenario was selected because of the potential for high fishing pressure. It was noted increased participation would likely be the reason for high fishing pressure in the future and that increases would be gradual given the highly restrictive regulations currently in place. Fishing mortality was simulated to increase as in the ***Base*** scenario, but then stabilize at these high levels. Commercial fisheries in the northern stock are constrained by catch caps and unlikely to experience increasing fishing mortality in the future, so fishing mortality for commercial fleets was held constant and all increases are attributed to recreational fleets.

Increasing Adult Selectivity (***Inc Sel***) – This scenario was selected because of anecdotal information that catch and release targeting of trophy-sized red drum may have increased in recent years. The selectivity of the largest sized fish by all recreational fleets was increased to

simulate this change in targeting. This scenario included the projected fishing mortality in the ***Base*** scenario.

Misspecified Natural Mortality (***Miss M***) – This scenario was selected as natural mortality is considered an uncertain life history attribute of red drum that is likely misspecified often in stock assessments. This scenario focused on misspecification, particularly scale of natural mortality, by using the Hoenig (1983) scaler for natural mortality-at-age in the OM and the Then et al. (2015) scaler for fixed natural mortality-at-age in the EMs. This scenario included the projected fishing mortality in the ***Base*** scenario.

Depressed Productivity (***Depr R***) – This scenario was selected to represent the potential for deteriorating productivity due to factors such as reduced nursery habitat (e.g., climate change, increased development of coastal areas). Indices of abundance indicate this may already be occurring in South Carolina waters in recent years. Maximum productivity (i.e., unfished recruitment) was set to decline then stabilize at a lower level. This scenario included the projected fishing mortality in the ***Base*** scenario.

Terminal Year of 2023 (***2023 Term Yr***) – This scenario was selected to evaluate the response of the EMs' performance when truncating the assessment data time series to a period similar to that of the upcoming benchmark stock assessment. The ***Base*** scenario settings were used but specified with an earlier terminal year (2023) for sampled data.

6.1.1.2 Data Prioritization Scenarios

Longline Survey Time Series Necessary to Estimate Spawning Stock Biomass (***NoLL, 15yrsLL, 30yrs, LL45yrs, LL60yrs***) – This scenario was identified based on questions in the last stock assessment about how long the adult longline surveys time series need to be to address the cryptic biomass issue and reliably estimate spawning stock biomass. This scenario was structured with a set of sub-scenarios. The first sub-scenario (***NoLL***) used the ***Base*** scenario settings, but without longline survey data (total index and composition data). The second sub-scenario (***15yrsLL***) included longline survey data, but for only the last 15 years of the assessment time series. Each subsequent sub-scenario added 15 years of longline survey data working backwards until the full time series of data back to the true survey start years was included (i.e., the ***Base*** scenario).

Implement Recreational Discard Length Composition Sampling (***B2 Dat, Prec B2 Dat***) – This scenario was identified as recreational discard length composition sampling remains the primary data gap for assessing red drum. This scenario was structured with two sub-scenarios based on different data settings for the two stocks. The first sub-scenario (***B2 Dat***) included low precision composition sampling data for the recreational discards in the northern stock, but does not apply to the southern stock because these data are already included in the core population dynamics scenarios for this stock. The second sub-scenario included high precision composition sampling data for the recreational discards and applies to both stocks. This scenario is intended to address the question of whether recreational discard composition data improves red drum stock assessments.

6.2 Operating Model Descriptions

6.2.1 Background

The ss3sim R package (Anderson et al. 2014; Johnson et al. 2021), a simulation platform to complement the SS modeling framework (Methot and Wetzel 2013), was used in this simulation assessment. The package implements an SS model configuration with all parameters fixed to user-specified values as an OM to simulate a population with true, known population dynamics according to a user-specified fishing mortality trajectory for each fishing fleet. Using the SS modeling framework allows for many of the tested complexities built into the framework that are appealing for realistic simulation of red drum-like stocks to be applied and readily modified in OMs. The package includes sampling algorithms to sample data with error from the simulated population that are subsequently used to make predictions of the population dynamics with an EM. Scenario testing can be conducted by changing the OM configuration, data sampling algorithms, or EM configuration and evaluating the EM's ability to recover the simulated population dynamics generated by the OM. Scenarios with changes to the OM configuration or EM configuration allow for a unique understanding of an EM's performance under potential structural differences between a true population being assessed and the EM that might be experienced in a benchmark stock assessment (i.e., misspecification) given the quantity and quality of data available. This type of scenario testing also allows for an evaluation of a respective EM's performance relative to other candidate EMs with their own structural differences that are being considered for stock assessment models. Scenarios with changes to the data sampling algorithms allow an understanding of changes to EM performance under changes to quantity and/or quality of data that can be used to prioritize future data collection efforts.

The package typically passes data files produced from the sampling algorithms to an SS EM in an end-to-end process (Anderson et al. 2014). However, since EMs developed outside of the SS framework were considered in this simulation, only the OM and sampling algorithm components of the package were used. Data files produced within the package were modified as necessary to the format accepted by each EM and fit externally to estimate the population dynamics. Performance statistics are then calculated and compared among candidate EMs and scenarios.

Each scenario generates a specified number of iterations of the population dynamics with unique process and observation error. For this study, 100 iterations were generated for each scenario. The package uses random seeds to generate recruitment deviations and sampled data sets specific to the iteration number across scenarios. That is, iteration 1 recruitment deviations are identical for scenario X, scenario Y, etc. Iteration-specific sampled data only changes between scenarios when there are changes to the OM specifications (e.g., fishing mortality or life history characteristics) or data sampling algorithms. The recruitment deviations represent process error and the sample data introduce observation error according to the level of user-specified precision for each sampled data set. Using random seeds specific to the iteration number allows for reproducibility and removes confounding effects of different process and observation error across scenarios. Each iteration is considered a plausible state of nature under the population characteristics and data sampling precision specified in the OM.

Data types that can be sampled include total retained catch, total discarded catch, total dead discarded catch, indices of abundance, length compositions (fishery catches and indices of abundance), and age compositions (fishery catches and indices of abundance). Additional details on the ss3sim package are available in Johnson et al. (2021).

6.2.2 Red Drum Simulation Operating Models

OMs were constructed from available information on red drum stocks to simulate dynamics of red drum-like stocks through time and provide sampling data replicating data available from *in situ* stocks for stock assessment. The goal of using available information for red drum was to arrive at reasonable approximations of *in situ* red drum stocks to allow inference about EM performance for *in situ* stocks, not to make predictions of true exploitation histories of the *in situ* stocks. An iterative tuning process (Section 6.2.3) was used to update preliminary parameterizations of the OMs described in the following section. OMs are length-and age-structured models that project the stock forward through time and track stock dynamics at an annual time step across length bins and age bins according to conversions from an internal growth model. Separate OMs were developed for each regional stock based on differences in life history as well as past and anticipated future assessment structures. Length bins were set at 2 cm intervals starting at 12 cm out to the largest bin observed in each stock. Similarly, ages were tracked starting at age-1 through the maximum age observed in each stock (62 for the northern stock, 41 for the southern stock). Spawning occurs in the middle of August and YOY settle and are tracked in the model the following January (i.e., age-1 recruitment). The model does not differentiate between sexes, except in calculation of spawning stock biomass which is females only according to a 1:1 sex ratio.

Simulation time periods were structured to include a pre-fishery burn in period, a historical fishery period, and a projection period (Table 38). Pre-fishery burn in periods were set equal to the respective stock's age structure to achieve unfished equilibrium conditions at the start of the fishery. Therefore, the pre-fishery burn in period starts the number of years before the historical fishery period equal to the number of age classes in the stock. The historical fishery period was set to start in 1901, assuming non-negligible fishing mortality began in this year, and continue through 2019, the terminal year of observed data available for this simulation. The historical fishery period was structured to simulate a historical exploitation pattern similar to that of red drum stocks based on available information. The projection period started in 2020 and was also set equal to the respective stock's age structure.

6.2.2.1 Life History

Life history information specified in the OMs includes age-specific K growth model parameters, Lorenzen (2005) length-based natural mortality-at-age (calculated internally from a fixed value for age-2 fish), length-weight relationship parameters, logistic female maturity-at-age, and stock-recruit relationship parameters (Table 39). All of these parameters were calculated from available red drum data, except stock-recruit relationship parameters, and additional details on these parameters are in Section 2. A Beverton-Holt stock-recruit relationship is used in the OMs and includes parameters for unfished recruitment (*R0*), steepness (*h*), and variation around the expected stock-recruit relationship (*sigma R*). No estimates of the relationship parameters are available for red drum, so meta-analyses were used to specify *h* (Shertzer and Conn 2012) and

sigma R (Beddington and Cooke 1983). With these constraints, *R0* was then adjusted during the tuning process. Female spawning stock biomass (SSB) calculated from the specified maturity and length-weight relationship parameters is the measure of reproductive potential used in the stock-recruit relationship. All parameters are time-invariant with the exception of *R0* in the ***Depr R*** scenario.

6.2.2.2 Fishing Fleets and Surveys

Fishing fleets and monitoring surveys were structured to replicate those operating on the *in situ* red drum stocks. The fishing fleets are defined based on sectors and fishing gears with different regulations and selectivity patterns. Fishing fleets sample catch with lognormal error and composition data with multinomial error. Monitoring surveys sample indices of abundance with lognormal error and composition data with multinomial error.

The northern stock has three fishing fleets (Table 43) and three monitoring surveys (Table 45). Fishing fleets include a commercial fleet fishing gillnets and beach seines, a commercial fleet fishing other gears (mostly pound nets), and a recreational fleet fishing hook and line gears. The monitoring surveys include a survey indexing age-1 recruitment, a survey indexing primarily sub-adult abundance inshore, and a survey indexing mature abundance. Additionally, the model samples CPUE from the recreational fishery as a fishery-dependent index of abundance.

The southern stock has three fishing fleets (Table 46) and nine monitoring surveys (Table 47). Fishing fleets include recreational fleets fishing hook and line gears for each of the three states in the southern stock. Historically, commercial red drum fishing did occur in these states, but most of this fishing was eliminated by the late 1980s (Section 4.1). It's assumed that commercial selectivity would have been similar in these states and years to recreational selectivity and, therefore, any commercial catch was interpreted as part of the recreational fleet (i.e., combined with the recreational catch) during the tuning process. The monitoring surveys include three surveys indexing age-1 recruitment, three surveys indexing primarily sub-adult abundance inshore, and three surveys indexing mature abundance. Some of these surveys have been discontinued and were also discontinued during the same year within the historical period of the OM. Additionally, the model samples CPUE from the recreational fisheries as a fishery-dependent index of abundance (see Appendix 2 for recreational fishery CPUE specifications).

Observation error was specified in the OMs based on measures of observation error provided with the monitoring data sets available for assessment. Observation error data included standard errors for lognormal catch and index of abundance data and sampling replicates as a measure of sample size for multinomial composition data, assuming a clustered sampling design (i.e., lack of independence) that results in sample sizes less than the absolute number of individuals measured for size or age (Nelson 2014). A change point analysis was conducted on each time series of observation error data. Blocks of constant observation error levels set to the mean of the calculated observation error across the block were specified for any periods that did not have support for changes from the change point analysis up to constant levels across the full time series (Table 43 - Table 47). There are no observation error data available for commercial catch (e.g., levels of misreporting), so standard errors were assumed based on time

periods identified during the SEDAR Best Practices workshop (SEDAR 2015b) and biologists' knowledge of catch monitoring programs and changes to these programs through time. All initial observation error levels were then tuned, as necessary, during the tuning process.

Fishery catch occurs throughout the year, while monitoring surveys sample at specified points within the year. These points were generally set to match the midpoint of the *in situ* surveys (Table 43 - Table 47).

6.2.2.3 Selectivity

Double normal, length-based selectivity functions were used for all fishing fleets and all monitoring surveys except age-1 recruitment surveys. The double normal selectivity patterns represent selectivity for total catch. Fishing fleet catch is further partitioned into harvest and discards according to a length-based retention curve. Subsequently, discards are partitioned into live discards and dead discards according to a specified discard mortality rate. Age-based selectivity patterns are derived from length-based selectivity and the internal growth model or set to select age-1 fish only for recruitment surveys. Fishing fleet selectivity varied through time in yearly block patterns according to changes in red drum regulations.

Initial selectivity and retention specifications were set based on available information from a combination of published studies, regulations, length composition data, life history, supporting selectivity analyses, and expert opinion (see Appendix 2 for more detail). All initial length-based selectivity specifications were then tuned during the tuning process.

6.2.2.4 Fishing Mortality

Fishing mortality estimates from past state-specific stock assessments and published studies were used for initial specifications of fleet-specific fishing mortality in the OMs, where available. As the scale of these estimates is not necessarily directly relatable to the OM configurations (e.g., age-based fishing mortality vs. length-based fishing mortality) and come from several sources, only the trend information was used by applying a constant scaler to these estimates. Assumptions were made to fill in missing fishing mortality specifications.

For the northern stock, fishing mortality at the start of the historical fishery period (1901) through the end of World War II was assumed to be low and stable. There are no fishing mortality estimates until published estimates from a tag study start in 1983 (Bacheler et al. 2008). These fishing mortality estimates start high and it's suspected this high level of fishing mortality was occurring before this year back to at least the mid-1970s when the state of North Carolina implemented its first management measures to regulate the harvest of red drum. Therefore, fishing mortality for each fleet was specified to follow a linear ramp from the low stable value at the end of World War II to an average of the Bacheler et al. 2008 estimates during a high exploitation period preceding strict regulations (1983-1991) in 1975. Random draws were then made from the 1983-1991 period for specifications from 1976-1982. The Bacheler et al. 2008 estimates were used from 1983 until they end in 2004. Random draws from the Bacheler et al. 2008 estimates during the years 1999-2004, when fishing mortality was estimated to decrease due to implementation of strict regulations, were made for specifications from 2005-2019.

The assumption of low stable fishing mortality prior to the end of World War II was made for the southern stock as well. Florida conducted an assessment in 2015 on red drum in Atlantic state waters with a start year shortly after this period in 1950 (Chagaris et al. 2015), and so the low stable values were carried forward through 1949 and the assessment estimates were used for the FL_Recreational fleet through 1988. Florida updated the 2015 stock assessment in 2020 (Addis 2020), but with a start year of 1989. These estimates were used for the remaining years of the historical fishery period. There was no information on fishing mortality of the SC_Recreational fleet until estimates for 1982 and later from a state stock assessment (Murphy 2017). Therefore, a linear ramp was assumed to occur in fishing mortality between the low, stable fishing mortality in 1946 and the average of the assessment estimates from 1982-1985 for 1981. The assessment estimates were then used for all years until they end in 2015. Random draws of the assessment estimates during 2007-2015 were used for the remaining years 2016-2019. There are no estimates of fishing mortality for the GA_Recreational fishing fleet and so the trend was assumed the same as South Carolina due to more similar regulation histories between these states.

6.2.2.5 Catchability

Each survey includes a catchability coefficient scaling its relative catch rate to the absolute abundance its tracking. Initial catchability coefficients were tuned during the tuning process.

6.2.2.6 Benchmark Calculations

The OM threshold benchmarks ($R_{30\%}$, $F_{30\%}$, $SPR_{30\%}$, $SSB_{30\%}$) are calculated with terminal three-year averages of life history characteristics, selectivity, and fleet-specific relative fishing mortality. The $F_{30\%}$ benchmark is in terms of age-2 fish and is the level of fishing mortality that achieves $SPR_{30\%}$. The $R_{30\%}$ and $SSB_{30\%}$ benchmarks are the levels of these respective parameters when the stock is fished at $F_{30\%}$ according to the specified stock-recruit relationship. The only exception is for the ***Depr R*** scenario which calculates $R_{30\%}$ and $SSB_{30\%}$ based on the historical stock-recruit relationship before productivity decreases in the projection period, as the objective of this scenario was to evaluate the EM's ability to recognize the decreased productivity relative to the historical baseline.

6.2.3 Tuning Process

An iterative tuning process was used to adjust the OM parameterizations so they produced sampled data sets with trend, magnitude, and variability similar to observed data sets provided from *in situ* monitoring programs. Annual dynamics were not considered during tuning as simulated recruitment deviations are likely different from *in situ* recruitment deviations leading to within year differences between simulated and observed data sets.

Figures showing comparisons of observed and simulated data sets are provided in Appendix 4 and Appendix 5. Catch magnitudes and trends were used to tune *R0*, survey catchability coefficient, fishing mortality, retention, and discard mortality rate parameters. The scale of fishing mortality and *R0* were tuned until the catch magnitudes were similar, the stock status matched perception of stock status through time (overfishing in the 1970s and 1980s, reduced fishing pressure in the later 1990s and 2000s), and the trends in indices of abundance were

similar. Initial fishing mortality trends were only modified if there were clear mismatches during multi-year stretches of the time series. Maximum retention parameters were tuned by comparing proportion of the catch discarded and discard mortality rates were tuned by simultaneously matching the scale of the total discarded fish and dead discards. Catchability coefficients were tuned by matching the magnitude of indices on their original scale.

Selectivity patterns, including retention, were tuned by matching the proportion of catch discarded and length and age composition data aggregated over selectivity block (fishery fleets) or the data time series (indices of abundance).

Observation error levels were tuned by comparison of variation through time (catch and indices of abundance) or within a year across the size or age structure (composition data). Simulated data sets from a single iteration were used for these comparisons so variability was not smoothed by averaging across iterations.

Tuning was only done when there were distinct differences between observed and simulated data sets and, in some cases, these differences could not be resolved with the tuning process due to the structure of the OM. When conflicts occurred resulting in mismatches, priority was placed on later more data rich periods.

6.2.4 Limitations

There are a few aspects of the OMs that limit their ability to simulate sampling data that matches observed data, indicating some differences in the population dynamics of the simulated stocks and *in situ* stocks. The first primary limitation is the lack of spatially-explicit sampling algorithms. The *in situ* southern red drum stock has multiple fishery-independent surveys indexing the same age component of the stock (e.g., age-1 recruitment), but at localized, sub-stock scales (i.e., within state waters). The non-spatially-explicit OM is providing what are essentially replicate observations of the same underlying abundance trend for the multiple indices. There has been evidence of divergent trends among the observed indices that the OM cannot replicate (Figure 10 in Appendix 5). Therefore, the OM provides a simplified simulation of data sampling that does not have the ability to provide indices with divergent trends that the EM must then reconcile in the fitting process. The inclusion of multiple surveys in the OM does, however, integrate random noise from observation error coming from multiple indices as would be experienced in assessment of the *in situ* stock. In the northern stock, this limitation is less of a concern given there is only one index available for each component of the stock abundance, all coming from the state that accounts for the vast majority of stock removals in any given year (North Carolina). Multiple indices with divergent trends can cause conflict and poor stability in non-spatially-explicit EMs (Conn 2010), so it would be worthwhile to consider index synthesis analyses that can provide a single index representing the underlying overall stock abundance trend as an input to the southern EMs. This approach would better align the OM sampling design in this simulation assessment and EM inputs in subsequent stock assessments of the *in situ* stock.

The second primary limitation of the OM is the coarse annual tracking of the stocks. Red drum grow rapidly in their first few years of life and experience differing seasonal fishing pressures throughout the year. The OM simulates fishery catches under constant fishing mortality

throughout the year. This limitation precludes the OMs from simulating composition data sets that match the observed data sets. This is most noticeable in OM undersampling age-1 fish which become disproportionately more vulnerable to fishing late in the year due to fast growth from less vulnerable sizes earlier in the year in the *in situ* stocks (Figure 28 in Appendix 5). This also impacts simulated composition sampling data for fishery-independent surveys that operate over broad seasons. These surveys sample snapshots of the length compositions at a specified point in the year in the OM and tend to sample more bimodal length compositions than *in situ* surveys sampling over broader periods that capture a broader range of the annual growth (Figure 19 - NC_GillNet in Appendix 4; Figure 17 - SC_Trammel and SC_StopNet in Appendix 5).

6.2.5 Simulated Population Dynamics

The population dynamics during the historical period are shared across scenarios, while the dynamics during the projection period change through changes to the ***Base*** scenario OMs according to the core population dynamics scenarios discussed in Section 6.1. In addition to changes to the OMs across the core population dynamics scenarios, the data sampling algorithms of the ***Base*** scenario OMs were also changed for the data prioritization scenarios dealing with changes to recreational discard composition sampling (***B2 Dat*** and ***Prec B2 Dat***). The data prioritization scenarios dealing with changes to the longline survey time series (***No LL***, ***15 yrs LL***, ***30 yrs LL***, ***45 yrs LL***, ***60 yrs LL***) and the ***2023 Term Yr*** core population dynamics scenario were accomplished with changes (reductions) to the existing data sets from the ***Base*** scenario OMs and did not require any changes to these OMs. Population dynamics from the ***Base*** scenario are discussed below, followed by select population dynamics/sampling data highlighting changes to OMs in other scenarios.

6.2.5.1 Base

Both stocks experienced low, stable fishing mortality through the 1940s (Figure 112 and Figure 113). Fishing mortality ramped up and peaked in the 1970s and 1980s at levels associated with overfishing (i.e., SPR<30%; Figure 114 and Figure 115). Fishing mortality then decreased sharply following increased regulations in response to the high fishing mortality. Fishing mortality varied around these lower levels in the 1990s and started to increase again around the 2010s.

Fishing mortality was set to ramp up through the beginning of the projection period to levels associated with ≈15% SPR in the mid-2030s. Fishing mortality then decreases sharply to levels associated with ≈45% SPR, simulating a management response similar to that seen in the historical period, and remains at these levels for the remainder of the projection period.

In the northern stock, the North_Recreational fleet accounted for the greatest proportion of fishing mortality throughout most of the historical period based on the relative magnitude of observed catch by this fleet followed by the North_Commercial_GNBS and North_Commercial_Other fleets (Figure 116). Only the North_Recreational fleet fishing mortality was simulated to change in the projection period based on anticipation that the commercial fleets will remain primarily red drum bycatch fleets as they were at the end of the historical period.

In the southern stock, the FL_Recreational fleet accounted for the highest proportion of fishing mortality throughout the historical period based on the relative magnitude of observed catch by this fleet followed by the SC_Recreational and GA_Recreational fleets (Figure 117). All fleets experienced the same proportional changes to fishing mortality throughout the projection period.

The stock-recruit relationships reflect high variability in realized age-1 recruitment (Figure 118-Figure 119) which is expected for red drum due to extraneous environmental factors driving recruitment not explicit in the OMs (Goldberg et al. 2021). Age-1 recruitment shows high variability among iterations (Figure 120-Figure 121) as well as between years (Figure 122-Figure 123). Despite the high variability, there are noticeable longer-term impacts to recruitment levels from the high fishing mortality levels experienced by the future spawning stock in the 1980s and the beginning of the projection period (Figure 124-Figure 125), as well as positive impacts in response to deceasing fishing mortality following these periods.

Sub-adult abundance shows declines as fishing mortality ramps up after World War II, hitting a low point in the later 1900s at the time of the heaviest exploitation (Figure 126-Figure 127). Sub-adult abundance rebounds as regulations become increasingly conservative in the 1990s and 2000s. Sub-adult abundance then declines again as fishing mortality ramps up in the 2010s and the beginning of the projection period. There is a slight increase as the fishing mortality decreases in the late 2030s before the sub-adult abundance stabilizes under the stable fishing mortality levels just above the current management target for the *in situ* stocks ($SPR_{40\%}$).

Mature abundance (Figure 128-Figure 129) and SSB (Figure 130-Figure 131) follow similar trends as the sub-adult abundance. The stocks rebuild at slower rates under the more subtle fishing mortality reductions in the projection period than under the fishing mortality reductions during the historical period.

6.2.5.2 High F

Instead of reductions in fishing mortality following the increases at the beginning of the projection period, the fishing mortality remains at high levels equivalent to ≈15% SPR for the remainder of the projection period in the ***High F*** scenario (Figure 132-Figure 133). This high fishing mortality prevents any stock rebuilding like that seen in the ***Base*** scenario and the stock remains overfished in the later part of the projection period (Figure 134-Figure 135).

6.2.5.3 Inc Sel

Selectivity of the largest, oldest fish that have matured and moved to offshore habitats was increased to 0.4 in all recreational fishing fleets during the projection period in the ***Inc Sel*** scenario. This scenario simulates an increased targeting of these fish in a catch and release trophy fishery. The change doubles selectivity from the end of the historical period in all recreational fleets except the FL_Recreational fleet which increased from <0.01. The increased vulnerability of these larger, older fish to discard mortality decreases the SPR from the ***Base*** scenario in the latter part of the projection period to just below the current management target (Figure 136-Figure 137). The stock does rebuild by the end of the projection period in a majority

of iterations, but from a greater initial depletion and to a smaller stock size than in the ***Base*** scenario (Figure 138-Figure 139).

6.2.5.4 Miss M

The natural mortality estimator used to scale the natural mortality across ages was changed to a historical estimate from Hoenig 1983 (Figure 140-Figure 141) in the ***Miss M*** scenario. This estimator is lower than the Then et al. (2015) estimator used in the ***Base*** scenario resulting in a lower natural mortality across the age range. The lower natural mortality allows more fish to escape to and build up in the spawning stock biomass, changing the scale of the stock (including during the historical period) to more than twice the size under the natural mortality in the ***Base*** scenario (Figure 142-Figure 143).

6.2.5.5 Depr R

The *R0* parameter followed a declining trend over the first twenty years of the projection period in the ***Depr R*** scenario to a value 50% lower than the historical value for the remainder of the projection period. The declines in realized recruitment result in much less frequent year classes at the levels from the historical stock-recruit relationship associated with threshold fishing levels (Figure 144-Figure 145). The stocks' decline below the historical baseline spawning stock biomass threshold is exacerbated by the diminishing productivity during the ramping fishing mortality in the beginning of the projection period before stabilizing at the smaller, less productive regime under the stable fishing mortality just above the current management target (Figure 146-Figure 147).

6.2.5.6 B2 Dat and Prec B2 Dat

Precision for recreational discard length and age composition data and recreational CPUE length composition data, which are used in the core population dynamics scenarios for the southern EMs, was set to be lower than the retained catch composition data precision from the corresponding fleet (Table 46). These specifications were also applied when introducing these data to EMs in the ***B2 Dat*** scenario for the northern stock. Precision was then increased in the OMs for both stocks to the same precision levels specified for the retained catch composition data in each respective fleet (Table 43 and Table 46, average precision across fleets for South_Rec_CPUE) for the ***Prec B2 Dat*** scenario. The impact of increased precision for these simulated sampling data can be seen in Figure 148- Figure 167.

6.3 Estimation Model Descriptions

Three assessment approaches were selected as candidate EMs based on their past use or consideration for red drum assessment and their suitability to the three assessment frameworks recommended in the road map for future red drum stock assessments (see Section 1). A red drum TLA framework was developed during this assessment and selected as a model-free stock indicator assessment framework. A TLA had never formally been applied to red drum stocks for management advice, but it was explored as a potential assessment approach following the most recent stock assessment and before the road map for future red drum stock assessments was finalized. The SCA models used for management advice in the most recent

assessment were selected as an assessment framework intended to provide estimates primarily of the juvenile, sub-adult portion of the stocks. Although the models are configured to include adult information and provide estimates of the adult portion of the stocks, these estimates have not been considered reliable for management advice in previous stock assessments (Section 1.3). The models lump all ages older than age-6 into a plus group and do not estimate spawning stock biomass or a link between adults and productivity (i.e., no stock-recruit relationship). Integrated models developed in SS were selected as an assessment framework intended to estimate population dynamics of all life stages of the stocks. Although, models developed in this platform were attempted in SEDAR 44, they have not been accepted for management advice in the past. The configurations evaluated here include modifications with new features not available in SEDAR 44, notably dome-shaped retention functions for fishing fleets to better align with slot limit management approaches, that were hoped to offer improvements over the configurations in SEDAR 44. These models track all age classes in the stocks, estimate spawning stock biomass, and link adults to productivity through an estimated stock-recruit relationship.

6.3.1 Traffic Light Analysis

6.3.1.1 Introduction

The TLA was first developed (Caddy and Mahon 1995; Caddy 1998; Caddy 1999; Caddy et al. 2005) for application in data-limited fisheries and can provide an information basis for fish stock management decisions that is not constrained by a model-based framework.

The TLA uses colors like that of a traffic light to represent the state of a fishery based on appropriate indicators (i.e., an index or time-series of relevant data). Indicators are used to compare recent years of data with previous years to detect trends. The type of indicators may vary and can be based on population and/or fishery dynamics such as abundance, growth, reproduction, removals, or other metrics that are appropriate to the available data. These indicators may be derived from various fishery-independent or fishery-dependent sources (e.g., survey derived indices, harvest/landings time series) and can be representative of various phases in the life cycle (e.g., juvenile, sub-adult, adult). The temporal extent of appropriate indicators should span multiple generations to be representative of population trends.

One common method called the strict traffic light method uses hard boundaries based on reference points to assign a color and uses a binary logic model. Another method called the fuzzy traffic light method uses a fuzzy logic model where the transitional color (yellow) is based on the proportion of adjacent color the indicator is trending towards (e.g., yellow/red or yellow/green).

Reference points are identified as either limit reference points or target reference points. A limit reference point (the focus of this simulation assessment, referred to hereafter as “threshold”) might be thought of as unacceptable outcomes such as an indicator value moving from yellow to red whereas target reference points are desirable outcomes where a stock status objective has been achieved such as a target SPR or SSB. Setting reference points requires identifying appropriate metrics to indicate when stock status moves from fully

acceptable to unacceptable with a buffer zone between the two to provide warning of proximity to unacceptable conditions.

The objective here was to apply the simulation framework to evaluate the application of TLA methodology to the northern and southern stocks of red drum for use in resource management. The TLA structure was optimized for performance using outputs from the OM and then TLA performance was compared against other stock assessment approaches for use in predicting population dynamics under a variety of selected scenarios.

6.3.1.2 Framework and Optimization

A TLA framework was developed for this simulation analysis using R (code available upon request). The fuzzy method was applied to each indicator by calculating the relative proportions of each color for each year based on the trends from a selected reference period (RP) in the time-series that was considered representative of previous trends. This was accomplished by setting the expected value of an indicator to a relative proportion of 1 for yellow and 0 for red and green (Figure 168). The intersection of the color lines at 0.5 relative proportion corresponds to the 95% confidence intervals derived from the RP values. The relative proportion of 1 for red and green and 0 for yellow were set to 2 times the confidence intervals. Corresponding linear regression equations were calculated to determine the slope and intercept coefficients which, were used to determine a proportion of red, yellow, and green for each value of an index.

The resulting color proportions were then compared to a selected threshold and any value with a proportion red above the threshold would potentially trigger a management action (Figure 169) which, can be based on a conditional rule such as a selected number of consecutive years above the threshold. It was important to select an appropriate number of consecutive years above the threshold for the initiation of management action as a short time frame may be too sensitive to annual variability (stochasticity) in indicator values and can be mistaken for changes in fishing pressure. Conversely, a time frame requirement of too many consecutive years above the threshold may result in slow responsiveness to significant changes in fishing pressure.

Multiple indicators of the same characteristic were combined into composite “characteristics” designed to collectively represent a characteristic of interest for management (e.g., abundance, production, recruitment, fishery performance). These indicators are additive and the resulting combined index was rescaled from 0 to 1 (ASMFC 2020; Halliday et al. 2001).

The TLA is a versatile tool for application to a variety of data types and as such, this method can provide a framework for resource management when other fisheries management methods may not be appropriate due to limitations in data. However, for this reason, there were challenges to evaluating the TLA method in comparison with age-structured assessment models and decisions were made by the red drum SAS to facilitate the optimization of the TLA approach for red drum stocks and for effective comparison to other stock assessment approaches.

It may be inappropriate to select a long time series for the RP since long-term averages can be affected by regime shifts in stock productivity and/or fishing pressure. Therefore, the RP was selected for the northern red drum stock as 1996–2013 and for the southern stock as 1991–

2013 when these stocks were not overfished based on the previous stock assessment results. The expected value was calculated as the geometric mean of the indicator values during the RP and the confidence intervals were based on the expected value and standard deviation from the indicator values during the RP.

The characteristics selected for the TLA (Table 48) were chosen based on available data from the stocks and simulated in the OMs (Table 49) and these characteristics included recruitment, sub-adult abundance, adult abundance, sub-adult production, adult production, and fishery performance. Abundance indicators were developed from fishery-independent survey relative indices of abundance indexing various components of the stock abundance. Production characteristic indicators were developed using median length (sub-adult indicators) or median age (adult indicators) from available fishery-independent data that was considered representative of the population characteristic. Median length was used for sub-adult indicators because this life stage only includes a few ages and length is considered a better indication of truncation or expansion of this component of the stock. Median age was used for adult indicators because growth slows and length-at-age overlaps considerably for adults, making age a better indication of truncation or expansion of this component of the stock. Fishery performance was defined as the relative harvest fishing mortality which was calculated by dividing the harvest of slot-sized fish by an appropriate survey (same state or stock where the fleet is operating) derived index of slot-sized fish for each year. The northern stock had one fishery performance indicator with all harvest summed across the three fishing fleets, while the southern stock had two fishery performance indicators, one for SC and one for FL (no index of slot-sized fish in GA). For some characteristics such as indicators specific to the sub-adult population that were evaluated as proxies for the adult population, the changes affecting the sub-adult population may take several years to be transmitted to the adult population and, therefore, it may be appropriate to lag the sub-adult data during optimization.

A grid search was performed to optimize the threshold (in reference to proportion red), number of consecutive years to trigger management action, and appropriate lag. The grid search was performed for each year in the projection period data time series and each characteristic over 100 simulated datasets for each of the core population dynamics scenarios and for both the northern and southern red drum stocks. The grid matrix consisted of potential threshold values ranging from 0.05 to 0.95 by 0.05 increments, number of consecutive years to trigger management action from 1 to 10 years, and potential lag (for sub-adult characteristics) by year from 1 to 10 years.

For each year of the projection period, the TLA was applied to the data subset up to the year being evaluated and whether a management action was triggered or not was compared to an appropriate stock status (i.e., recruitment condition favorable or poor, SSB status of overfished or not overfished, or fishing status of overfishing or not overfishing - Table 32) generated from the OM for that year to indicate a type I error, type II error, or correct response. The minimization of combined error rate (the cumulative proportion of both type I and II error rates over the projection period years) was the basis for optimization. Optimal values were tabulated over a range that would achieve the optimal combined error rate (Table 50 and Table 51). The minimum and maximum optimal values for each characteristic over all scenarios were averaged

and the average of the resulting minimum and maximum averages were used in the final simulation analysis (Table 52 and Table 53).

The final optimized values for threshold, number of consecutive years to trigger management action, and appropriate lag were then applied to the simulated data for each stock, scenario, corresponding characteristic, iteration, and for each projection period year to calculate the proportion red and whether a management action was triggered. Error rates were calculated as described above and these results were then used in comparison to other stock assessment methods to evaluate the effectiveness of TLA as a management tool.

6.3.2 Statistical Catch-at-Age Model

6.3.2.1 Historical Use of the Statistical Catch-at-Age Model

The SCA models have been used to assess the northern and southern red drum stocks since 2009. The models were first used in the SEDAR 18, replacing the three models used previously by Vaughan and Carmichael (2000): a separable virtual population analysis, a spreadsheet statistical catch-at-age analysis, and virtual population analysis conducted using FADAPT. The SCA models were coded in AD Model Builder (code available upon request) and included special features unique to red drum. This included the incorporation of tagging estimates from an external study into the model for the northern stock and restricting the selectivity for older ages in the SCA. Additionally, some discard selectivities were fixed using external estimates when discard composition data were too poor for estimation. While this assessment was accepted for management use by the ASMFC, concerns were raised about the reliability of adult red drum abundance estimates. This was especially true in the northern red drum stock assessment which showed an exponential decline is adult red drum abundance that was believed to be a model artifact. The northern red drum model was also sensitive to the inclusion of the tag-based estimates used in the model fitting. For the southern model, estimates of the SPR and other benchmark values were very uncertain. While it seemed likely that neither stock was below its $SPR_{30\%}$ threshold, the Board desired that an overfished reference point could be developed in future assessments.

During SEDAR 44, the SAS developed models using the SS integrated analysis framework. This assessment was the first done that incorporated data on the adult portion of the red drum stocks through the inclusion of longline survey data. It was hoped that the inclusion of these data would aid in the ability of the models to estimate reliable estimates of adult spawning stock biomass. Data were included to estimate discard size compositions from various state tagging programs as well as volunteer angler surveys. While the SS models were recommended for use by the peer review panel, they were not accepted for management use by the Board due to concerns with the reliability of population parameter estimates. The SAS was tasked with evaluating the use of the SCA from the previous assessment, updating it as necessary in a subsequent stock assessment (ASMFC 2017b). An updated version of the SCA had been developed earlier in SEDAR 44 which estimated the discard selectivities from discard proportion-at-age data in both stocks. While this model version was explored in the assessment, there were concerns about model stability and the SAS ultimately recommended using the SCA model from SEDAR 18 for the most recent assessment with minimal changes in

model structure. The main changes in the model were in the data included, again specifically including data from the longline surveys and updating the data streams through 2013. Again, the stocks were determined to be above their $SPR_{30\%}$ thresholds but the same issues from SEDAR 18 remained. The SAS did not have confidence in the adult biomass estimates and therefore did not recommend an overfished reference point.

6.3.2.2 General Description

The SCA model used for red drum includes age-specific data for red drum ages 1 through 7^+ and the model starts in 1989. It is a standard SCA model programmed in AD Model Builder that includes some features unique to red drum.

The first unique feature involves the estimation of the selectivity-at-age for each selectivity block. Given the regulatory history of red drum (i.e., a slot size) and red drum migrations offshore as they age, selectivity of red drum drops off sharply around age 4. To model that in the SCA, selectivity is estimated non-parametrically for ages 1-3 within each block and for each fleet. The selectivity for age 4 and ages 5^+ is then calculated using an estimated proportion for each age's selectivity relative to the selectivity estimated for age 3. These two parameters, one for the proportion of age 4 selectivity and one for the proportion of ages 5^+ selectivity relative to age 3, are estimated across all selectivity blocks within the model but differed between harvest and discard fleets (if the discard fleet selectivity was estimated).

The second unique feature involves the inclusion of external tag based estimates of fishing mortality in the northern model. These estimates were based on a tagging study conducted by Bacheler et al. (2008). Two tagging datasets were used: the estimated F-at-age from 1989-2004 (the last year of the study) for ages 1, 2, 3, and 4^+ and the full F estimated for released fish between 1989-2004. The full F of released fish was used in the model fitting rather than the F-at-age as estimates of the selectivities-at-age based on tagging data were also fixed in the northern model for the discard fleet. These estimates were included in the model fitting for the base northern model runs for all of the scenarios explored in this assessment though some alternative model scenarios were explored where these data were either removed from the model fitting or were adjusted (see Section 7.1.2).

The observed data for these models included: total annual kill by fleet, CVs for total annual kill by fleet, proportion-at-age for the harvest (both stocks) and releases (southern stock only) each year, effective number of ages sampled each year for each fleet, F-at-age for the combined "harvest" fleets during 1989-2004 (northern stock only), CVs for F-at-age for the combined "harvest" fleets during 1989-2004, fully-recruited F for recreational live release fishery during 1989-2004 (northern stock only), CVs for fully-recruited F for the recreational live release fishery during 1989-2004, annual survey catch per unit effort, and CVs for annual survey catch per unit effort.

Weight-at-age and natural mortality were calculated for each iteration of each scenario the way these values would be estimated in a traditional benchmark assessment. This was intended to capture some of the uncertainty that could be introduced by misspecifying growth (i.e., using a von Bertalanffy growth curve in the assessment model as opposed to the age-specific k growth curve in the OM) and by having fewer samples of older fish to fit to.

For each iteration of each scenario, the mean and standard deviation of the OM's observed length distribution for each age class was sampled to develop a dataset of length-at-age. The number of samples generated for each age was based on the number of samples that have been historically collected for each stock. As a result, sample sizes for ages 0-5 were high and declined for older fish (Figure 170). A von Bertalanffy growth curve was fit to the sampled data to characterize length-at-age for each iteration of each scenario. Differences between the growth curves calculated for each iteration were small, which is not surprising given the overall large sample sizes being drawn from the OM distributions; however, the SCA length-at-age inputs did diverge from the OM due to the differences in growth curve structure, with the SCA inputs overestimating length-at-age for ages 9-20 and underestimating it for ages 20+ (Figure 171).

Because length-weight parameters tend to be estimated very precisely, the true length-weight relationship parameters from the OM were used to convert length-at-age to weight-at-age for each iteration.

The weight-at-age for each iteration of each scenario was used to calculate M-at-age using the Lorenzen (1996) formulation, scaled to the Then et al. (2015) longevity-based estimate of M. The estimates of M-at-age used in the SCA were very similar to the values of M-at-age used in the OM (Figure 172). M-at-age was averaged over age-7 to the maximum age for each stock to calculate the M for the plus group (age-7+).

Natural mortality in the model was assumed constant over time though age-varying for each stock (Lorenzen 1996). Natural mortality for ages 1 through 7^{+} was used in the population dynamics model while natural mortality through the maximum observed age (62 in the northern stock and 41 in the southern stock) was used in calculations of SPR. Maturity-at-age differed between stocks and the values used were those calculated in SEDAR 44 and used in the OM. Recruitment in the SCA was modeled as deviations from the mean recruitment and the deviations were not constrained to sum to zero.

There were a number of input parameters (part of model structure) that were assumed to be known and without error. These input parameters included: M-at-age, maturity-at-age, defined periods of constant selectivity, selectivity for all ages for the northern recreational live release fishery, release mortality, ages selected for each survey, and survey time of year.

For each stock, a single executable file was used for most scenarios analyzed in this assessment. This executable was run from an R code which would bring in the data files created from the OM, format them to be used in the executable file, and save the outputs for each iteration. Different executables had to be compiled, however, for some of the scenarios explored. Specifically, a different executable file was used for the northern stock when the recreational discard selectivity was estimated rather than fixed; an estimated discard selectivity was one of the data prioritization scenarios explored (***B2 Dat*** and ***Prec B2 Dat***). Because of how some of the stock assessment code is hard coded for particular variables, new executable files also had to be compiled for scenarios when the terminal year of the assessment was changed (***2023 Term Yr***).

6.3.2.3 Model Configuration and Equations

The population dynamics models were based on annual fleet- and age-specific separable F:

$$F_{f,y,a} = F^{*}_{f,y} s_{f,y,a},$$

where $F_{f,y,a}$ is the instantaneous ***F*** caused by fleet ***f*** in year ***y*** on age ***a*** fish, ***F**** is the apical ***F*** for fleet ***f*** in year ***y***, and ***s*** is the selectivity, a bounded number ranging from zero to one, for fleet ***f*** in year ***y*** at age ***a***. Given red drum's inherent reduced vulnerability after age-3 due to their movement from estuarine waters to nearshore waters and to enacted maximum size limits, the selectivity for ages-4 and 5^{+} fish were restricted to be between 0-100% of the selectivity at age-3. Selectivity was therefore estimated for each fleet (other than the northern discard fleet) for ages 1-3 in each of the time periods for which the selectivity was assumed not to have changed for each fishery. Selectivity for ages-4 and 5^{+} was derived from the estimated age-3 selectivity for a given time period and the proportional selectivity parameters for ages-4 and 5^{+}. In the northern model used in this assessment, these proportional selectivity parameters were assumed to be constant across selectivity blocks and harvest fleets (discard fleet selectivity was assumed fixed based on Bacheler et al. 2008). In the southern model used in this assessment, these proportional selectivity parameters were assumed to be constant across selectivity blocks and constant across fleets of the same type (i.e., constant across harvest fleets and constant across the discard fleets).

The abundances of the different age groups in the population are modeled forward in time beginning with estimates for a series of recruits ($N_{y,1}$ in 1989 through the end of the time series for each stock's projection period) and an initial year's abundance-at-age ($N_{1989,a}$ for ages 2-7^{+}). These initial conditions were both modeled as lognormally distributed variables. From these starting abundances, older ages are sequentially modeled as:

$$N_{y+1,a+1} = N_{y,a} e^{-\sum_f F_{f,y,a} - M_a},$$

where M_a is the age-specific instantaneous natural mortality rate. A "plus" group abundance included survivors from both the previous year's plus group and that year's next-to-oldest age group

$$N_{y+1,A} = N_{y,A-1} e^{-\sum_f F_{f,y,A-1} - M_{A-1}} + N_{y,A} e^{-\sum_f F_{f,y,A} - M_A},$$

where ***A*** is age 7^{+}.

The observation model for these analyses involves total catch, the proportion of the fleet- and year-specific catch in each age group, and indices of abundance. The fleet- and year-specific predicted catch-at-age, $C_{f,y,a}$, was calculated using the

Baranov catch equation:

$$\hat{C}_{f,y,a} = N_{y,a} \frac{F_{f,y,a}}{\sum_f F_{f,y,a} + M_a} \left(1 - e^{-\sum_f F_{f,y,a} - M_a}\right),$$

with the annual total catch for each fleet determined by summing across ages and the proportion- at-age in the catch determined from the age-specific catch relative to this annual total. The observed catch has an assumed lognormal error, ε_{fya}, from the true catch and the model estimates the true catch.

Indices of abundance were assumed linearly related to the stock abundance of chosen age group(s):

$$\hat{I}_{s,y} = q_s N_y,$$

where $I_{s,y}$ is the predicted index of relative abundance for the age(s) caught by survey s in year y, q_s is the proportionality constant for survey s, and N_y is the abundance for the age(s) included in the index.

The objective function used to confront the observation model predictions with the observed data contained abbreviated lognormal negative log likelihoods for fleet- and year-specific total catch and annual indices of abundance were:

$$negLL(T_f) = \sum_y \left(0.5 \frac{\left(ln(T_{f,y}+1.e^{-6}) - ln(\sum_a \hat{C}_{f,y,a}+1.e^{-6})\right)^2}{\sigma_{f,y}^2} + ln(\sigma_{f,y}) \right),$$

where $T_{f,y}$ is the observed total number killed each year y by fleet f and $\sigma_{f,y}$ is the standard error of the total catch within each fleet each year. The variance was estimated from the reported CVs using $\sigma^2 = ln(CV^2+1)$. The CVs were available for the recreational fisheries as the PSEs and were assumed low (0.01) for the commercial fisheries. Likewise, the negative log likelihoods for the indices of abundance were:

$$negLL(I_s) = \sum_y \left(0.5 \frac{\left(ln(I_{s,y}+1.e^{-6}) - ln(q_s \sum_a \hat{N}_{y,a}+1.e^{-6})\right)^2}{\sigma_{s,y}^2} + ln(\sigma_{s,y}) \right),$$

where $I_{s,y}$ is the observed index for the age(s) in the survey in year y, and $\sigma_{s,y}$ is the standard error of the survey index in year y, estimated from the original data. In the case of multi-age indices, estimated abundances across these ages would be compared to the overall index value.

For the catch proportion-at-age, a multinomial negative log likelihood was used:

$$negLL(P_{f,y}) = -\sum_a \left(n_{f,y}(P_{f,y,a} + 1.e^{-6}) ln\left(\frac{\hat{C}_{f,y,a}}{\sum_a \hat{C}_{f,y,a}} + 1.e^{-6}\right) \right),$$

where $P_{f,y,a}$ is the observed proportion-at-age a in the total catch for fleet f in year y and $n_{f,y}$ is the sample size for aged fish. These components were not included for the fleets where the selectivity estimates based on tagging were used (northern live release recreational fishery).

There were additional observed data derived from a long-term tag-recapture study conducted in North Carolina that was utilized in the northern stock model. The estimated F-at-age and their standard errors for the pooled harvest (kept) fisheries in the north during 1989-2004 were included in the northern stock's objective function as:

$$negLL(F_{tag(y)}) = \sum_y \left(0.5 \frac{\left(ln(F_{tag(y,a)}) - ln(\sum_f \hat{F}_{f,y,a})\right)^2}{\sigma_{tag(y,a)}^2} + ln(\sigma_{tag(y,a)}) \right),$$

where $F_{tag(y,a)}$ and $\sigma_{tag(y,a)}$ are the observed F and its estimated standard deviation for year y and age a. The estimated F-at-age were only tallied for the recreational kept and commercial fisheries. Likewise, F-at-age estimates for the recreational live release fishery were available for

the period 1989-2004 from the tagging study. However, since the selectivity vectors from this program were used as input parameters because of the lack of observations for the catch-at-age for this fishery, only the information from its fully-recruited ***F*s** were used in the northern stock's model:

$$negLL\left(F_{full(y)}\right) = \sum_y \left(0.5 \frac{\left(ln\left(F_{full(y)}\right) - ln\left(\sum_f \hat{F}_{full(y)}\right)\right)^2}{\sigma^2_{full(y)}} + ln\left(\sigma_{full(y)}\right) \right),$$

where $F_{full(y)}$ and $\sigma_{full(y)}$ represent the fully recruited ***F*s** for the recreational live release fishery and its standard deviation.

The final component of the objective function included the sum of squares for the log of the unstandardized (to unity) selectivities for each fleet-specific selectivity period for ages-1 through 3. These values were configured as a deviation vector whose sum equaled zero. This added stability to the solution search routine.

The resulting objective function included input weights (lambdas, ***λ*s**) for the different likelihoods that reflected the relative perceived levels of accuracy associated with the estimation equations for the predicted values. The final objective function was:

$$ObjFunction = \sum_f \left(\lambda_{TC(f)} negLL\left(T_f\right)\right) + \sum_{f,y} \left(\lambda_{P(f,y)} negLL\left(P_{f,y}\right)\right) + \sum_s \left(\lambda_s negLL(I_s)\right) + \sum_{1989}^{2004} \left(\lambda_{Ftag} negLL\left(F_{tag(y)}\right)\right) + \sum_{1989}^{2004} \left(\lambda_{Ffull} negLL\left(F_{full(y)}\right)\right).$$

Note that the F_{tag} and F_{full} negative log-likelihoods were not part of the southern stock model.

Lambda Weighting

In SEDAR 18 and ASMFC 2017b, a variety of hypotheses were developed in relation to the data inputs used in the model and the perceived quality of the data. These external lambda weights were applied to the objective function and the best assessment model was determined by using a number of criteria. These included the total standardized residual sum of squares (RSS), visual inspection of data fits, the value of the index standardized residual sum of squares, and qualitative evaluation of age-4 and 5^+ proportional selectivity parameter estimates (i.e., estimates away from the upper bound of 1).

Given the infeasibility of testing all combinations of the lambda weighting hypotheses for all scenarios and iterations, the SAS originally decided to carry forward the lambda weights of the best fitting models from the last assessment. This meant that for the northern stock model, unity weights (1) were used in the negative log likelihood for the total catch, indices, and tagging data, and commercial harvest proportion-at-age; the recreational harvest proportion-at-age data was downweighted by 0.01 (recreational discard selectivity was fixed in this model). In the southern stock model, unity weights (1) were used in the negative log likelihood for the total catch, indices, and harvest proportion-at-age data; the recreational discard proportion-at-age data was downweighted by 0.1. However, after further exploration of the effect of different lambda weighting on model convergence (see Section 7.1.1) and consideration of the setup of the SS EM used in this assessment, the SAS decided to use unity weights for all model runs (i.e., all lambda weights set to 1).

Parameters Estimated

Parameters were estimated for: age 1-3 selectivity during each block of years within a fishery where selectivity was assumed constant, age-4 and age 5^+ selectivity as a proportion of age-3 selectivity, the fully recruited instantaneous ***F*** (also referred to as apical ***F***) for each fishery each year, the initial abundance for ages 2-7^+, annual recruitment, and catchability coefficients for each survey. All parameters were estimated in log space.

Uncertainty and Estimates of Precision

Estimated CVs (or PSEs) were used as measures of the precision for observed kill, index, and tagging F data. For the proportion-at-age data, the effective sample sizes indicated the precision of the observed data.

Model sensitivity to certain assumed values, such as growth and the inclusion of the tagging data, were explored in this assessment. More detail on these analyses is in Section 7.

Benchmark and Reference Points

The benchmarks estimated for this assessment include the $SPR_{30\%}$, $F_{30\%}$, and mature abundance associated with $SPR_{30\%}$ ($N_{30\%}$) as a proxy for SSB status.

For each iteration, $F_{30\%}$ was calculated using the estimated weight-at-age and M-at-age as well as the average selectivity across all fleets from the last three years of the model, weighted by the fleet-specific *F.* A single maturity curve was used for all iterations within a stock. The full age range of weight and M values were used; M was not averaged at age-7 as it was for the population model. The *sbpr()* function from the *fishmethods* package in R was used to do the calculations.

Mature abundance was used as an SSB proxy because of the sensitivity of the model estimates of SSB to the age structure and weight-at-age assumptions of the plus group in the SCA model. To calculate the corresponding mature female abundance reference point, $N_{30\%}$, the population was projected forward for 200 years under a fishing mortality rate equal to the $F_{30\%}$ using the time-series median recruitment for each iteration. The sex ratio was assumed to be 1:1. The level of mature female abundance where the population stabilized under those conditions was used as the SSB proxy reference point.

6.3.2.4 Northern Stock

Parametrization

Life history parameters used in the northern stock model are shown in Table 54.

Natural mortality was constant through time but assumed to be age varying (Lorenzen 1996). Two series of natural mortality estimates were used in different parts of the model. The population dynamics model used the natural mortality for ages-1 through 7^+ as that was the maximum age used in developing the catch-at-age information. The SPR calculations, however, used the natural mortality-at-age estimated through age-62, the maximum age of the stock. As fishing mortality was only estimated through age-7^+ in the population dynamics model, the SPR calculations assumed the same fishing mortality applied to each age over age-6.

Maturity-at-age information was based on the analyses conducted from North Carolina data in SEDAR 44 and used in the OM. As this information was used in developing estimates of SPR and mature abundance for this assessment, these estimates of maturity-at-age were calculated though age-62. However, all red drum in the northern stock were assumed to be fully mature by age-6.

Weights-at-age differed between iterations within a scenario and were fixed based on external estimates. These estimates were calculated using the von Bertalanffy equation and used the true length-weight relationship parameters from the OM (see Section 6.3.2.3).

Four fishing fleets were used in the northern red drum SCA model. These included: the northern commercial gill net/beach seine (North_Commercial_GNBS) fleet; the northern commercial other (North_Commercial_Other) fleet which included data on red drum commercially harvested by other gears such as pound nets; the northern recreational (North_Recreational) harvest fleet; and the North_Recreational discard fleet. Selectivity blocks for these four fleets in the model were based on changes in regulations through time (Table 55). Each of the four fleets in the northern model had three selectivity blocks: 1989-1991, 1992-1998, and 1999-2082.

Selectivity in the model was estimated for each harvest fleet and selectivity period. Selectivity was estimated non-parametrically for ages 1-3. For ages-4 and 5^{+}, the model estimates the proportion, bounded between 0 and 1, of the selectivity relative to the estimated age-3 selectivity. These estimates are constant across the three harvest fleets (North_Commercial_GNBS, North_Commercial_Other, and North_Recreational harvest). The resulting age-4 and 5^{+} selectivity is then calculated by multiplying these estimated, constant proportions by the selectivity estimated for age-3 for each fleet and selectivity block. In the northern model, the recreational discard selectivity for each selectivity period is fixed based on estimates from the external tagging study (Bacheler et al 2008). This was done initially in SEDAR 18 as there wasn't much reliable data on the length frequencies of discards. While SEDAR 44 explored using tagging data to estimate the discarded recreational length frequencies and models were developed which could utilize those data, in the form of discard catch-at-age, the final configuration used in that assessment maintained the use of the fixed discard fleet selectivity as it improved model stability. This same configuration was maintained for this assessment in most of the scenarios analyzed except for the data prioritization scenarios that included using sampled discard proportion-at-age data to inform the recreational discard selectivity (***B2 Dat*** and ***Prec B2 Dat***).

Parameters estimated in the population dynamics model are shown in Table 56. All estimates were calculated in log space and include: annual F estimates for each fleet, selectivity estimates for ages 1-3 for each fleet and selectivity block (with the exclusion of the recreational discard fleet for most scenarios), the selectivity proportions for ages-4 and 5^{+}, recruitment for each year, the initial abundances for ages 2-7^{+}, and scalars for each of the five indices used in the model.

Input Data

Four fleets were developed to describe catch in the northern stock: a North_Commercial_GNBS fleet, a North_Commercial_Other fleet, a North_Recreational harvest fleet, and a North_Recreational discard fleet (Table 55). Input catch data to the model included total annual harvest from each of the three harvest fleets and recreational releases, both in numbers of fish. An assumed recreational discard mortality rate of 0.08 was applied to the number of fish released alive to estimate the number of recreational dead releases. Input data also included the estimated age-proportions in these annual harvests and for the data prioritization scenario about recreational discard data, also included the estimated age-proportions in the annual dead discards. CVs to the catch data as well as effective sample sizes of ageing data were based on the levels set in the OM when the data were sampled.

Indices of abundance are used in the assessment model to "tune" agreement between the model-predicted and observed trends in abundance (Table 57). Five indices were used in the northern model from four different surveys: the North Carolina bag seine survey (NC_BagSeine), the North Carolina Independent Gill Net Survey (NC_GillNet), a recreational catch per unit effort survey (North_Rec_CPUE), and the North Carolina longline survey (NC_Longline). The NC_BagSeine survey measures the relative abundance of age-1 fish. While fish are sampled in the fall, the index is advanced to the start of the year when YOY will first be age-1. The NC_GillNet survey samples both age-1 and age-2 fish in the middle of the year. These data are split into two age specific surveys as no age composition data is used in fitting this index in the SCA model. The North_Rec_CPUE index is assumed to capture information on fish ages 1-3 though as with the gill net survey above, this index does not include any age composition data and is fit as an aggregate index which is sampled mid-year. The last index, the NC_Longline survey, is assumed to occur in the late summer/fall (month=8 in the model) and it is used as a relative index of abundance of red drum ages-7^{+}. As with the other age-based surveys used in the SCA model, the model only fits to the age aggregate index and does not incorporate age composition data so the selectivity for the index is assumed constant for all ages. CVs for all indices were sampled to match what is observed in the *in situ* surveys.

Less conventional "tuning" in the northern SCA model was provided by estimates of age-specific instantaneous F available from the long-term tag-recapture program conducted in North Carolina (Bacheler et al. 2008). In the northern stock, estimates for F-at-age were available for the combined harvest fisheries (commercial and recreational harvest). These estimates and associated CVs were used to "tune" the model-estimated F-at-age for ages 1-4^{+} during 1989-2004. The 1989-2004, annual fully recruited *F*s estimated for the live releases were also used to compare against that fishery's fully recruited *F*s estimated within the model. Only the fully recruited *F*s were fit, as the selectivity-at-age information was also used to estimate the age composition of the live release fishery mortality in the northern model.

6.3.2.5 Southern Stock

Parametrization

Life history parameters used in the southern stock model are shown in Table 58.

Natural mortality was constant through time but assumed to be age varying (Lorenzen 1996). Two series of natural mortality estimates were used in different parts of the model. The population dynamics model used the natural mortality for ages-1 through 7^+ as that was the maximum age used in developing the catch-at-age information. The SPR calculations, however, used the natural mortality-at-age estimated through age-41, the maximum age of the stock. As fishing mortality was only estimated through age-7^+ in the population dynamics model, the SPR calculations assumed the same fishing mortality applied to each age over age-6.

Maturity-at-age information was based on the analyses conducted from South Carolina data in SEDAR 44 and in the OM. As this information was used in developing estimates of SPR and mature abundance for this assessment, these estimates of maturity-at-age were calculated though age-42. However, all red drum in the southern stock were assumed to be fully mature by age-10.

Weights-at-age differed between iterations within a scenario and were fixed based on external estimates. These estimates were calculated using the von Bertalanffy equation and used the true length-weight relationship parameters from the OM.

Five fishing fleets were used in the southern red drum SCA model. These included: the Florida recreational (FL_Recreational) harvest fleet; the Georgia recreational (GA_Recreational) harvest fleet; the South Carolina recreational (SC_Recreational) harvest fleet; the FL_Recreational release fleet; and the GA_Recreational / SC_Recreational release fleet. Selectivity blocks for these four fleets in the model were based on changes in regulations through time (Table 59). Both the harvest and release fleets for Florida had a single selectivity block estimated for 1989-2061. The GA_Recreational harvest fleet had three selectivity blocks: 1989-1990, 1991-2001, and 2002-2061. The SC_Recreational harvest fleet had five selectivity blocks in the model: 1989-1992, 1993-2000, 2001-2006, 2007-2017 and 2018-2061. The combined GA_Recreational / SC_Recreational release fleet, which has been combined historically due to limited recreational discard data from Georgia as well as similar regulations between the two states, had three selectivity periods defined: 1989-1992, 1993-2001, and 2002-2061.

Selectivity in the model was estimated for each fleet and selectivity period in the southern model (i.e., no recreational release fleets were assumed to have fixed selectivity based on external estimates). This differs from the southern base model used in the SEDAR 44 assessment which had the FL_Recreational discard fleet selectivity fixed based on values from Bacheler et al 2008. While these estimates had come from North Carolina data, regulations were similar enough between the two regions for the period selected that it was deemed acceptable. Selectivity in the SCA was estimated non-parametrically for ages 1-3. For ages-4 and 5^+, the model estimates the proportion, bounded between 0 and 1, of the selectivity relative to the estimated age-3 selectivity. Separate estimates of these age-4 and age-5+ parameters were estimated for the three harvest fleets (the FL_Recreational harvest fleet, the GA_Recreational harvest fleet, and the SC_Recreational harvest fleet) combined and the two recreational release fleets (the FL_Recreational release fleet and the GA_Recreational / SC_Recreational release fleet) combined. The parameters were constant across all selectivity blocks. The resulting age-4 and 5^+ selectivity for each fleet is then calculated by multiplying these estimated, constant proportions by the selectivity estimated for age-3 for each fleet and selectivity block.

Parameters estimated in the population dynamics model are shown in Table 60. All estimates were calculated in log space and include: annual F estimates for each fleet, selectivity estimates for ages 1-3 for each fleet and selectivity block, the selectivity proportions for ages-4 and 5^{+}, recruitment for each year, the initial abundances for ages $2\text{-}7^{+}$, and scalars for each of the thirteen indices used in the model.

Input Data

Five fleets were developed to describe catch in the southern stock: a FL_Recreational harvest fleet, a GA_Recreational harvest fleet, a SC_Recreational harvest fleet, a FL_Recreational release fleet, and a combined GA_Recreational / SC_Recreational release fleet (Table 59). Input catch data to the model included total annual harvest from each of the three harvest fleets and recreational releases, both in numbers of fish. An assumed recreational discard mortality rate of 0.08 was applied to the number of fish released alive to estimate the number of recreational dead releases. Input data also included the estimated age-proportions in these annual harvests and annual dead discards. CVs to the catch data as well as effective sample sizes of ageing data were based on the levels set in the OM when the data were sampled.

Indices of abundance are used in the assessment model to "tune" agreement between the model-predicted and observed trends in abundance (Table 61). Thirteen indices were used in the southern model developed from ten different surveys: the Florida 21.3 haul seine survey (FL_21.3_HaulSeine), the Georgia gill net survey (GA_GillNet), the South Carolina stop net survey (SC_StopNet), the South Carolina rotenone survey (SC_Rotenone), the South Carolina trammel net survey (SC_Trammel), the Florida 183 haul seine survey (FL_183_HaulSeine), a recreational CPUE survey (South_Rec_CPUE), the South Carolina historic longline survey (SC_Longline_historic), the South Carolina contemporary longline survey (SC_Longline_contemporary), and the Georgia longline survey (GA_Longline). Five of these surveys measure the relative abundance of age 1 fish. The FL_183_HaulSeine survey (1998-2061) and the SC_Rotenone survey (1989-1994) were both used to measure age-1 red drum relative abundance at the beginning of the year. The GA_GillNet survey (2003-2061), SC_StopNet survey (1989-1994) and SC_Trammel survey (1991-2061) were all used to measure age-1 relative abundance in the middle of the year. The SC_Trammel survey (1991-2061) was also used to estimate the ages-2 and 3 relative abundance of red drum in the middle of the year. Separate indices were developed for each age separately as no age composition data were included in the model fitting. Age-2 and 3 relative abundances were also fit to age specific indices from the FL_183_HaulSeine survey (1997-2061). This survey was also assumed to represent mid-year abundances of red drum. The South_Rec_CPUE index is assumed to capture information on red drum ages 1-3. Similar to the surveys described above, this index does not include any age composition data and is fit as an aggregate index which is sampled mid-year. This means that the index selectivity is assumed to be constant over those three ages. The last three indices are all longline surveys that are designed to sample the adult (age-7^{+}) red drum populations. South Carolina conducted a historic longline survey from 1994-2004 and has a contemporary longline survey that was used from 2007-2061 in the model. Georgia also has a longline survey that is used from 2006-2061 in the model. All of these adult longline survey indices are assumed to represent adult red drum abundance in the fall (month=9.5). As with the other age-based surveys used in the SCA model, the model only fits to the age aggregate index

for each of these surveys and does not incorporate age composition data into the model fitting. Therefore, the selectivity for each of these adult longline indices are assumed constant for ages-7^{+}. CVs for all indices were sampled to match what is observed in the *in situ* surveys.

6.3.3 Stock Synthesis Model

General Description

SS EMs for this red drum simulation assessment were developed in Stock Synthesis version 3.30.15. Further descriptions of SS options, equations, and algorithms can be found in the SS user's manual (Methot et al. 2020), the NOAA Fisheries Toolbox website (http://nft.nefsc.noaa.gov/), and Methot and Wetzel (2013). Model code is available at https://vlab.noaa.gov/web/stock-synthesis. The r4ss software (www.cran.r-project.org/web/packages/r4ss/index.html) was also utilized extensively to develop various graphics and summarize estimation model outputs.

EMs for both stocks were developed in SS for the core population dynamic scenarios (i.e., ***Base***, ***High F***, ***Inc Sel***, ***Miss M***, ***Depr R, 2023 Term Yr***) and the data prioritization scenarios (i.e., ***No LL, 15/30/45/60 yrs LL, B2 Dat, Prec B2 Dat***) described in Section 6.1. From these we also report here alternative structural scenarios (Section 7.3), which were prompted by the results of the core population dynamics scenarios. These models were of moderate complexity and are described in greater detail for each stock below.

In SS, four input files are required: a starter file containing filenames and details about output reporting, a data file containing model dimensions and the data, a control file specifying model parameterization and set-up, and a forecast file containing specifications for reference points and forecasts (Methot et al. 2020). A single control file was developed for each of the various scenarios and used across all iterations therein. The use of a single file was a more efficient and systematic way to model each of the varying data files (i.e., an iteration) within a particular scenario, as opposed to developing separate and different control files specific to each iteration of a scenario. For example, a single control file was developed for the ***Base*** core population dynamic scenario and was used for all data file iterations therein. Next, a separate control file was developed for the ***High F*** core population dynamic scenario and used on all data file iterations, etc.

Maximum Likelihood and Uncertainty

A maximum likelihood approach was used to evaluate the overall goodness of fit to each kind of data source. Datasets contained an assumed error distribution (e.g., lognormal) and an associated likelihood determined by the difference between observed and predicted values and the variance of the error distribution. The total likelihood is the sum of the individual component's likelihoods. The global best fit to all the data was determined using a nonlinear iterative search algorithm to minimize the total negative loglikelihood across the multidimensional parameter space.

Several approaches were used to assess model convergence on all iterations of each scenario and largely follow those described in Carvalho et al. (2021). First, all estimated parameters were checked such that none were estimated on a bound, which may indicate potential issues with

assumed model structure or data. Next, the maximum gradient component (a measure of the degree to which the model converged to a solution) was also compared to the final convergence criteria of 0.0001. Ideally, the maximum gradient component will be less than the criterion, but this is not an absolute requirement. Lastly, the Hessian matrix (i.e., the matrix of second derivatives of the log-likelihood concerning the parameters, from which the asymptotic standard error of the parameter estimates is derived) must be positive definite.

Uncertainty estimates for estimated and derived quantities were calculated after the model fitting based on the asymptotic standard errors from the covariance matrix determined by inverting the Hessian matrix (Methot and Wetzel 2013). Asymptotic standard errors provided a minimum estimate of uncertainty in parameter values.

The error structure for landings, discards, and indices was assumed to be log-normal. Multinomial distributions were assumed for the length and age composition data of the landings, discards, and indices, which have the variances estimated by the input effective sample sizes. The variance of the multinomial distribution is a function of true probability and sample size; thus, an increase in sample size represents lower variance and vice versa. No additional re-weighting methods on the length and age composition data (e.g., Francis 2011 or Punt 2017) were performed for both feasibility purposes (i.e., constrained time and resources to iteratively re-weight every iteration for each scenario) and congruency between the SS and SCA estimation model structures.

Weight-at-age and Natural Mortality

Estimates of asymptotic length (*Linf*), the von Bertalanffy growth coefficient (*k*), and their associated standard errors (SE) were calculated externally for each region by sampling the distributions of length-at-age from the OM and fitting a von Bertalanffy growth curve in R. The number of samples generated for each age was based on the number of samples that have been historically collected for each region. As a result, sample sizes for ages 0-5 were high and declined for older fish (Figure 170). Because the parameter estimates for each iteration were so similar, a single set of parameters was provided for each stock, rather than iteration-specific parameters. The parameters and their SEs were used as normal priors for estimating growth within the SS EM. The growth curve estimated externally did diverge from the OM size-at-age due to the differences in growth curve structure, with the fitted growth curve inputs overestimating length-at-age for ages 9-20 and underestimating it for ages 20+ (Figure 171).

Natural mortality of red drum was estimated assuming that M-at-age was inversely related to fish weight (Lorenzen 1996) and held constant over time. This relation was scaled so that the cumulative instantaneous rate predicted over the lifetime of the fish was consistent with the constant mortality-at-age estimate derived from maximum age (Then et al. 2015). The weight-at-age for each region was calculated from the predicted length-at-age from the von Bertalanffy growth curves for each region using a region-specific length-weight relationship. Again, because the M-at-age estimates across iterations were so similar, a single M-at-age vector was provided for each stock, rather than iteration-specific vectors. Estimates of M-at-age used as input to the estimation model were very similar to the M-at-age used in the OM (Figure 172).

Reference Point Calculations

Reference points for the EMs developed in SS were the same as used in the OM: $R_{30\%}$, $F_{30\%}$, $SPR_{30\%}$, and $SSB_{30\%}$ (see Section 6.2.2 and Table 40-Table 41). The $F_{30\%}$ benchmark is in terms of age-2 fish and is the level of fishing mortality that achieves $SPR_{30\%}$. The $R_{30\%}$ and $SSB_{30\%}$ benchmarks are the levels of these respective parameters when the stock is fished at $F_{30\%}$ according to the estimated stock-recruit relationship. For the ***Depr R*** scenario, $R_{30\%}$ and $SSB_{30\%}$ are estimated for the full assessment time series and represent a mix of historic productivity and reduced productivity during the projection period as the stock-recruit relationship was intentionally misspecified and not allowed to vary through time. However, for the ***Time-Var R*** scenario, $R_{30\%}$ and $SSB_{30\%}$ are calculated as in the OM and based on the historical stock-recruit relationship estimated through 2029 before productivity decreased from 2030 through the terminal year. Escapement (Esc_y) is not provided as output by SS and was therefore estimated first by calculating the *Z*-at-age from the output numbers-at-age, and then subtracting M-at-age to produce F-at-age matrices. Next, annual escapement was calculated as the exponent of the negative sum of age-specific fishing mortality rates in each year, Esc_t=exp(−ΣF_t), for ages 1 – 3 (Age-4 Esc_y) and ages 1 – 5 (Age-6 Esc_y).

6.3.3.1 Northern Stock

Overview

EMs developed for the core population dynamic and data prioritization scenarios in the northern stock were comprised of three fishing fleets (including landings, discards, landings-at-length and -age compositions, and discards-at-length and -age compositions where available), three fishery-independent indices of relative abundance (including length compositions where available), and one fishery-dependent index of relative abundance. The model estimated 192 out of the 223 parameters including, but not limited to, growth parameters (asymptotic length [*Linf*], von Bertalanffy growth coefficient [*k*], and the reference length for the start of von Bertalanffy growth [*Lmin*]) , virgin recruitment (*ln(R0)*), *steepness* (*h*), variability in recruitment (*sigmaR*), time-varying stock-recruit deviations, fishing mortality for each fleet and year that it was operational, length-based selectivity parameters for fleets, landings, discards, retention and indices with length composition data. The model derived estimates included a full time series of recruitment, population abundance, and biomass (total, spawning stock, and exploitable).

Data Sources

The following list summarizes the main data inputs used in the core population dynamic, data prioritization, and alternative structural scenarios (where available) for the northern stock EM:

- Stock Structure
- Life History
    - Age and growth
    - Natural mortality
    - Release mortality

    - Maturity
    - Fecundity
- Landings
    - North_Commercial_GNBS (thousands of fish): 1950 – 2082
    - North_Commercial_Other (thousands of fish): 1950 – 2082
    - North_Recreational (thousands of fish): 1981 – 2082
- Discards
    - North_Commercial_GNBS (thousands of fish): 1989 – 2082
    - North_Recreational (thousands of fish): 1981 – 2082
- Abundance indices
    - Fishery-independent
        - NC_BagSeine: 1992 – 2082
        - NC_GillNet: 2001 – 2082
        - NC_Longline: 2007 – 2082
    - Fishery-dependent
        - North_Rec_CPUE: 1991 – 2082
- Length and age compositions (2-cm TL bins; 1-year age bins)
    - Landings
        - North_Commercial_GNBS: 1989 – 2082
        - North_Commercial_Other: 1989 – 2082
        - North_Recreational: 1981 – 2082
    - Discards
        - North_Commercial_GNBS: 1989 – 2082
        - *North_Recreational: 1989 – 2082 (**B2 Dat, Prec B2 Dat** scenarios only*)
    - Indices
        - NC_GillNet: 2001 – 2082
        - NC_Longline: 2007 – 2082
        - *North_Rec_CPUE: 1991 – 2082 (**B2 Dat, Prec B2 Dat** scenarios only; length composition data only)*

Model Configuration

Previous stock assessments (since Vaughn 1996) have identified the northern stock of red drum on the U.S. Atlantic coast to be north of the North Carolina/South Carolina border based on

differences in life history characteristics. The EM developed in SS for the northern stock continued to follow this precedent and was spatially configured as a one area model.

Growth in the northern stock EM was configured according to the von Bertalanffy growth function (Table 62). Parameter values for asymptotic length (*Linf* = 114.9 cm TL), the von Bertalanffy growth coefficient (k = 0.264 yr^{-1}), and their associated standard errors (SE_{Lmax} = 0.158; SE_k = 0.001) were calculated externally and used as normal priors for estimating growth within the SS EM. The CV parameters in SS describe the variability in length-at-age for the minimum (*CVyoung*) and the maximum (*CVold*) observed ages. Growth in SS was configured such that fish grew according to the von Bertalanffy growth model immediately upon 'settlement' at age-1 beginning at *Lmin*. The timing of spawning was configured to mid-August and since the SS EM is a one season model, settlement was configured to occur on January 1 the following year where fish 'settle' as age-1 individuals. A fixed length-weight relationship ($w = a*L^b$) was used to convert body length (cm) to body weight (kg) with parameters: a = 1.1312e−5, b = 2.9827. For the alternative structural scenario ***Tru Grow&M***, growth was configured as in the OM (see Section 6.2.2) and parameters were fixed within the EM.

Natural mortality-at-age was derived externally as described above (Section 6.1.2.2). Based on a maximum age of 62 years, constant mortality-at-age for red drum in the northern stock was found to be 0.112 yr^{-1}. Therefore, natural mortality-at-age for red drum in the northern stock was found to range from 1.298 – 0.083 and values were fixed within the SS EM as an age-specific vector (Table 62). For the alternative structural scenario ***Tru Grow&M*** scenario, natural mortality-at-age was configured as in the OM (see Section 6.2.2) and parameters were fixed within the EM.

The SS EM was configured as a single sex model where the spawning biomass would be multiplied by a user-defined fraction female, here defined as *frac_female* = 0.50. Maturity was configured to be age-based using a logistic function where the A_{50} and *slope* parameters were those calculated by Arnott (2015a) for North Carolina in SEDAR 44 and used as fixed inputs. Fecundity was configured as non-linear eggs/kg on body weight ($eggs = a + wt^b$) and parameterized such that the number of eggs was equivalent to spawning biomass by fixing a=0.5 and b=1.

A Beverton-Holt stock-recruitment model was used and three parameters were simultaneously estimated: 1) *steepness* (*BH_steep*; the recruitment obtained at 20% of the virgin biomass), 2) the virgin recruitment estimated in log-space (*ln(R0)*), and 3) the standard deviation of natural log of recruitment (*sigmaR*). *SigmaR* penalizes deviations from the spawner-recruitment curve (calculated from *ln(R0)* and *steepness*) and it defines the difference between the arithmetic mean spawner-recruitment curve and the expected geometric mean (Methot et al. 2020). Simple annual deviations from the stock-recruitment function, which were constrained to sum to zero, were estimated assuming a lognormal error structure. In the alternative structural scenario ***Base h***, steepness was fixed at 0.99 and annual deviations were configured to no longer sum to zero. For the ***Time-Var R*** scenario, the *ln(R0)* parameter of the EM was configured as in the OM to vary through time beginning in year 2030. This scenario was explored only in the northern stock EMs.

The main recruitment deviations were estimated for the time period of greatest data-richness (1989 – 2082) and corresponds to the time series when length and age composition data of the commercial fleets become available. However, early recruitment deviations were estimated for 1975 – 1988 with the assumption that length and age composition data of the North_Recreational fleet along with information on removals from natural mortality and fishing could provide some indication of recruitment level trends. In SS, expected recruitment needs to be bias adjusted because of its assumed lognormal error structure. The adjustment is accomplished by applying a full-bias correction to the recruitment deviations which have enough data to inform the model about the range of recruitment variability (Methot et al. 2020). Following the recommendation from Methot and Taylor (2011) to use the full bias adjustment on data-rich years, the SS base model used full bias adjustment between 1987 – 2080 after which it phased out to no bias adjustment from 2081 – 2082.

The northern red drum stock was not assumed to be in equilibrium in the EM's start year of 1989 given the reported fishing history. This was configured by providing a positive value for the initial equilibrium catch and adding initial fishing mortality parameters for each fleet (Methot et al. 2020). Due to the associated high uncertainty, initial equilibrium catch values for each fleet were set to 50% of the landings reported in the model start year of 1989 and the associated lambdas were set to 0, thereby removing matching the equilibrium catches from the objective function. Fishing mortality was modeled using the hybrid method that uses a Pope's approximation to provide initial values for continuous F in each year in order to match observed catch. Therefore, year-specific F values were not specified as full parameters to be estimated in the model. Initial fishing mortality rates (F_{init}, the rate occurring prior to model start) by fleet were estimated by the model in the first phase and act more as an estimate of initial total mortality (Methot et al. 2020). Constant catchability was assumed for all surveys and estimated by the model.

Selectivity patterns describe the probability of fish's capture-at-length or -age by a given fishery or gear. Selectivity can be used to model different gear types, targeting, and fish availability according to the spatial utilization of fish and/or fishery. The northern stock EM was configured using length-based selectivity for all fleets and indices except for the NC_BagSeine index, which was configured as an age-1 index of relative abundance. The double normal selectivity pattern was used to model selectivity-at-length for all three fishing fleets as well as the NC_GillNet index. The North_Rec_CPUE index was mirrored to the North_Recreational fleet given the absence of length or age composition data in the EM and the NC_Longline index was configured using the single logistic function (as opposed to the double normal function used in the OM) for flat-topped selectivity to reduce over-parameterization and increase model parsimony. For data prioritization scenarios ***B2 Dat*** and ***Prec B2 Dat***, which included additional length composition data for the North_Rec_CPUE index, selectivity for the North_Rec_CPUE index was modeled using the double normal function.

In SS, retention is defined as a logistic function of size or age (Methot et al. 2020). Since regulations for red drum during the modeled time series are in the form of a size slot limit, retention was modeled as a dome-shaped function with size for the North_Commercial_GNBS and North_Recreational fleets. Live and dead discards for these two fleets were calculated and fit within the EM. Live discards were estimated by applying the converse of the retention

function to the total catch while dead discards were the result of assumed discard mortality rates (30% for the North_Commercial_GNBS and 8% for the North_Recreational fleets) and treated as fixed inputs assumed constant through time (Methot and Wetzel 2013).

Initial values for selectivity parameters were specified based on visual inspection of length compositions or on regulatory changes in size limits and parameter bounds were set large enough to avoid truncating the searching procedure during maximum likelihood estimation. The soft bounds option was applied which creates a weak penalty in order to move parameters away from the bounds (Methot et al. 2020). Furthermore, selectivity parameters which were less informed by the data (e.g., those controlling the shape of the descending portion of a selectivity function) or contained excessively high variance were constrained using a symmetric beta prior to keep the parameter out of an unrealistic solution space (e.g., peak of ascending slope below 15 cm) or local minima.

Selectivity time blocks consistent with the configuration of the OM were used to reflect changes through time in red drum vulnerability to gear and state-specific changes in minimum and maximum size limit regulations. Specified selectivity parameters were therefore newly estimated for each selectivity time block which replaced those from the previous time block.

6.3.3.2 Southern Stock

Overview

EMs developed for the core population dynamic and data prioritization scenarios in the southern stock were comprised of three fishing fleets (including landings, discards, landings-at-length and -age compositions, and discards-at-length compositions where available), nine fishery-independent indices of relative abundance (including length and age compositions where available), and one fishery-dependent index of relative abundance (including length composition data). The model estimated 192 out of the 237 parameters including, but not limited to, growth parameters (asymptotic length [*Linf*], von Bertalanffy growth coefficient [*k*], and the reference length for the start of von Bertalanffy growth [*Lmin*]) , virgin recruitment (*ln(R0)*), *steepness* (*h*), variability in recruitment (*sigmaR*), time-varying stock-recruit deviations, fishing mortality for each fleet and year that it was operational, length-based selectivity parameters for fleets, landings, discards, retention and indices with length composition data. The model derived estimates included a full time series of recruitment, population abundance, and biomass (total, spawning stock, and exploitable).

Data Sources

The following list summarizes the main data inputs used in the core population dynamic, data prioritization, and alternative structural scenarios (where available) for the southern stock EM:

- Stock Structure
- Life History
    - Age and growth
    - Natural mortality
    - Release mortality

    - Maturity
    - Fecundity
- Landings
    - SC_Recreational (thousands of fish): 1981 – 2061
    - GA_Recreational (thousands of fish): 1981 – 2061
    - FL_Recreational (thousands of fish): 1981 – 2061
- Discards
    - SC_Recreational (thousands of fish): 1981 – 2061
    - GA_Recreational (thousands of fish): 1981 – 2061
    - FL_Recreational (thousands of fish): 1981 – 2061
- Abundance indices
    - Fishery-independent
        - FL_21.3_HaulSeine: 1998 – 2061
        - SC_Rotenone: 1986 – 1994
        - GA_GillNet: 2003 – 2061
        - SC_StopNet: 1986 – 1994
        - SC_Trammel: 1991 – 2061
        - FL_183_HaulSeine: 1997 – 2061
        - SC_Longline_historic: 1994 – 2006
        - SC_Longline_contemporary: 2007 – 2061
        - GA_Longline: 2006 – 2061
    - Fishery-dependent
        - South_Rec_CPUE: 1991 – 2061
- Length and age compositions (2-cm TL bins; 1-year age bins)
    - Landings
        - SC_Recreational (thousands of fish): 1981 – 2061
        - GA_Recreational (thousands of fish): 1981 – 2061
        - FL_Recreational (thousands of fish): 1981 – 2061
    - Discards
        - SC_Recreational (thousands of fish): 1989 – 2061
        - GA_Recreational (thousands of fish): 1989 – 2061

        - FL_Recreational (thousands of fish): 1989 – 2061
    - Indices
        - SC_StopNet: 1986 – 1994
        - SC_Trammel: 1991 – 2061
        - FL_183_HaulSeine: 1997 – 2061
        - SC_Longline_historic: 1994 – 2006 (*length composition only*)
        - SC_Longline_contemporary: 2007 – 2061
        - GA_Longline: 2006 – 2061 (*length composition only*)
        - South_Rec_CPUE: 1991 – 2061 (*length composition only*)

Model Configuration

The EM for the southern stock was configured similar to the northern stock model; therefore, only differences will be described here.

The southern stock of red drum on the U.S. Atlantic coast (as described since Vaughn 1996) ranges between South Carolina and Florida and is based on differences in life history characteristics. The EM developed in SS for the southern stock continued to be spatially configured as a one area model representing this portion of the U.S. Atlantic coast.

Growth in the southern stock EM was configured according to the von Bertalanffy growth function (Table 63). Parameter values for asymptotic length (*Linf* = 97.6 cm TL), the von Bertalanffy growth coefficient (k = 0.366 yr^{-1}), and their associated standard errors (SE_{Lmax} = 0.150; SE_k = 0.001) were calculated externally and used as normal priors for estimating growth within the SS EM. A fixed length-weight relationship ($w = a*L^b$) was used to convert body length (cm) to body weight (kg) with parameters: a = 1.1312e−5, b = 2.9827. For the alternative structural scenario ***Tru Grow&M***, growth was configured as in the OM (see Section 6.2.2) and parameters were fixed within the EM.

Natural mortality-at-age was estimated externally as described above (Section 6.1.2.2). Based on a maximum age of 41 years, constant mortality-at-age for red drum in the southern stock was found to be 0.163 yr^{-1}. Therefore, natural mortality-at-age for red drum in the southern stock was found to range from 1.453 – 0.115 and values were fixed within the SS EM as an age-specific vector (Table 63). For the alternative structural scenario ***Tru Grow&M***, natural mortality-at-age was configured as in the OM (see Section 6.2.2) and parameters were fixed within the EM.

The SS EM was configured as a single sex model where the spawning biomass would be multiplied by a user-defined fraction female, here defined as *frac_female* = 0.50. Maturity was configured to be age-based using a logistic function where the A_{50} and *slope* parameters were those calculated by Arnott (2015a) for South Carolina in SEDAR 44 and used as fixed inputs. Fecundity was configured as non-linear eggs/kg on body weight ($eggs = a + wt^b$) and parameterized such that the number of eggs was equivalent to spawning biomass by fixing a=0.5 and b=1.

A Beverton-Holt stock-recruitment model was used and all three parameters (i.e., *steepness*, *ln(R0)*, and *sigmaR*) were estimated. Simple annual deviations from the stock-recruitment function, which were constrained to sum to zero, were estimated assuming a lognormal error structure. In the alternative structural scenario ***Base h***, steepness was fixed at 0.99 and annual deviations were configured to no longer sum to zero.

The main recruitment deviations were estimated for the time period of greatest data-richness (1989 – 2061). Early recruitment deviations were estimated for 1981 – 1988 where information on the length and age composition data of the three recreational fleets and removals from natural mortality and fishing could provide some indication of recruitment level trends. A full-bias correction to the recruitment deviations (Methot and Taylor 2011) was applied to years 1986 – 2060 after which it phased out to no bias adjustment in 2061.

The southern red drum stock was also not assumed to be in equilibrium in the EM's start year of 1989 given the reported fishing history. Model configuration follows the method reported above for the northern stock. Constant catchability was assumed for all surveys and estimated by the model.

The southern stock EM was configured using length-based selectivity for all fleets and indices except for the three age-1 indices of relative abundance: FL_21.3_HaulSeine, SC_Rotenone, and the GA_GillNet. The double normal selectivity pattern was used to model selectivity-at-length for all three recreational fishing fleets as well as the SC_StopNet, SC_Trammel, FL_183_HaulSeine, and South_Rec_CPUE indices. All three longline indices were configured using the single logistic function (as opposed to the double normal function used in the OM) to reduce over-parameterization and increase model parsimony.

Retention was modeled as a dome-shaped function with size for all three recreational fishing fleets. Live and dead discards for these fleets were calculated and fit within the EM. Live discards were estimated by applying the converse of the retention function to the total catch while dead discards were the result of assumed discard mortality rates (8% applied to all three recreational fishing fleets) and treated as fixed inputs assumed constant through time (Methot and Wetzel 2013).

Initial values for selectivity parameters were specified based on visual inspection of length compositions or on regulatory changes in size limits and parameter bounds were set large enough to avoid truncating the searching procedure during maximum likelihood estimation. The soft bounds option (Methot et al. 2020) as well as the use of symmetric beta priors were used here similar to their application in the northern stock model.

Selectivity time blocks largely consistent with the configuration of the OM were used to reflect changes through time in red drum vulnerability to gear and state-specific changes in minimum and maximum size limit regulations. Specified selectivity parameters were therefore newly estimated for each selectivity time block which replaced those from the previous time block. During the Assessment Workshop, the panel decided to make changes to the time block configuration in the southern EM for the GA_Recreational fleet where the 2002 – 2006 and 2007 – 2061 time blocks were combined to 2002 – 2061.

6.4 Model Configuration Comparisons

Configuration details are compared between the OM and the two population dynamics EMs (SCA and SS) for the ***Base*** scenario in Table 64-Table 66 (northern stock) and Table 67-Table 69 (southern stock).

7 RESULTS

Scenario results are presented in four groups: developmental, core populations dynamics, alternative structural, and data prioritization scenarios. Developmental scenarios included preliminary EM configurations used to inform the final configurations used in the core population dynamics scenarios. The core population dynamics scenarios, where EM performance was evaluated, simulated varying population dynamics likely to be encountered in future red drum assessments and are the primary scenarios informing recommendations on future red drum stock assessment models. For each of the core population dynamic scenarios, the OM was modified to generate the full range of varying population dynamics. Alternative structural scenarios were those conducted following the core population dynamics scenarios to address specific questions about stock-recruit relationship parameterizations and growth assumptions and include changes only to the EM configurations. Data prioritization scenarios were prioritized for this simulation assessment to inform monitoring and data recommendations that would improve future red drum stock assessments.

7.1 Developmental Scenarios

7.1.1 Convergence Exploration

Scenarios using alternate likelihood weighting schemes (***Base***, ***High F***, ***Inc Sel***) were conducted for the SCA EM to evaluate stability issues (i.e., low convergence rates) when using the preferred weighting schemes of the last stock assessment (***Base Alt Wgt***, ***High F Alt Wgt***, ***Inc Sel Alt Wgt***). Specifically, these scenarios were intended to address the questions: (1) Does the SCA convergence rate, particularly for the southern model, change with an alternate weighting scheme? and (2) Is the SCA stability issue likely to be a minimal concern in application of the model during a stock assessment or an issue that presents a considerable risk of applying the model during a stock assessment? In addition to the scenarios where the likelihood weighting scheme was changed within the EM, two additional summaries of performance metric data were evaluated to understand the performance effects of weighting choice that may be driven by convergence issues. The ***Max Conv*** scenario combined performance metrics from any iterations of the southern SCA model that converged using either the preferred weighting approach from the last assessment (***Base Alt Wgt***) or the weighting approach with equal unity weights on all likelihood components (***Base***). The objective of this alternative data summarization was to further evaluate if weighting scheme choice changes perception of summarized performance. This combination increased the convergence rate from 61% for the ***Base Alt Wgt*** scenario and 77% for the ***Base*** scenario to 84%. The ***Iter Filter*** scenario included performance metrics from only iterations that converged for both the SCA and SS EMs in each of the core population dynamics scenarios. The objective of this alternative data summarization was to evaluate if summarized performance is skewed by different convergence rates and

potentially different tolerances to find solutions between EMs. This alternate summary of performance metrics mostly involved excluding converged iterations for the SS EM which had higher converge rates near 100% for most scenarios.

Convergence rates of the SCA EM using unity weights on all likelihood components increased relative to the EM using the preferred weighting scheme from the last stock assessment except for the southern model under the ***Inc Sel*** core population dynamics scenario, which decreased by 5% (Table 70). There was a net gain of 42 converged iterations across models and scenarios using the unity weights and scenario-specific convergence rates increased to at least 77%. The weighting scheme choice impacted estimation of the stock scale for the northern stock, but had less effect on scale estimation for the southern stock and trend estimation for both stocks (Figure 173-Figure 176). The impacts to performance of the northern model depended on parameter and scenario, with improvements to accuracy across scenarios for parameters including sub-adult abundance and age-4 escapement and more mixed impacts for parameters including mature abundance and three year SPR ratios. The additional data summarization scenarios ***Max Conv*** (Figure 173-Figure 176) and ***Iter Filter*** (Figure 177) had negligible impact on performance indicating the results from each weighting scheme for the southern ***Base*** scenario and all iterations regardless of convergence in the other EM for all core population dynamics scenarios, respectively, are representative of SCA performance.

The unity weighting scheme is consistent with the weighting scheme in the SS EMs and also consistent between stocks within the SCA EMs which had likelihood components weighted differently using the preferred weighting scheme from the last assessment. This consistency makes performance more comparable among models and so the unity weighting scheme was used in final configurations for the core population dynamics scenarios.

7.1.2 Bacheler et al. 2008 SCA Inputs

The northern SCA EM has unique aspects including using external fishing mortality time series estimates from Bacheler et al. 2008 as data in the fitting process and using selectivity estimates for recreational discards from the same publication as fixed inputs in the model. These aspects introduce misspecification in the model as applied to the simulated stock including biased low discard mortality (Figure 178), biased high harvest mortality for ages 1-3 and biased low harvest mortality for ages 4+ (Figure 179), as well as biased low recreational discard selectivity for ages 3+ (Figure 180-Figure 182). As the simulated population dynamics likely differ from *in situ* population dynamics these published estimates were made from, it is unknown how misspecification for the simulated stock compares to misspecification, if any, for the *in situ* stock. However, several sources indicate similar misspecification for the *in situ* stock. Bacheler at al. 2010 estimated length-based selectivity for recreational discards, which were used to specify selectivity in the OM, and noted that the Bacheler et al. 2008 estimates may be underestimated for older ages. Peer reviewers of the SEDAR 18 stock assessment noted concerns with the very high fishing mortality estimates from Bacheler et al. 2008, particularly the first few years used in the stock assessment. Preliminary results of the core population dynamics scenarios using the Bacheler et al. 2008 data inputs were similar to results in past stock assessments which estimated very large mature abundances at the beginning of the assessment time series that decline exponentially. Past peer reviewers have identified this as an

artifact of the model. In addition to these indications of misspecification, exploration of the northern SCA in past assessments has indicated model stability relies on these estimates and, currently, there are no alternative fishing mortality estimates to use in place of the Bacheler et al. 2008 estimates.

Scenarios conducted to evaluate how treatment of the Bacheler et al. 2008 inputs impact performance included: a scenario with the recreational discard selectivity fixed to the true values from the OM (***B2 Sel***) but still using the misspecified fishing mortality estimates in model fitting, a scenario with the fishing mortality values sampled from the OM values with error levels according to the Bacheler et al. 2008 estimates (***Tru Fs***) but the discard selectivity still misspecified, a scenario with both the true OM recreational discard selectivity values and the fishing mortality values from the ***Tru Fs*** scenario (***B2 Sel&Tru Fs***), and a scenario with the external fishing mortality estimates excluded from the fitting process (***No Fs***). These scenarios were intended to evaluate performance under status quo monitoring and data availability. The unique northern SCA EM aspects are further evaluated for their impacts on performance when they interact with potentially new data sets (recreational discard composition data, Section 7.4).

Performance varied across the scenarios evaluating treatment of Bacheler et al. 2008 data in the northern SCA EM. Bias driven by the misspecified fishing mortality inputs early in the time series is reduced when the values sampled from the OM are used in place of the Bacheler et al. 2008 data and flips direction when no fishing mortality data are used in the fitting process (Figure 183). Despite the reduced bias, scenarios with fishing mortality sampled from the OM led to low convergence rates (Table 71).Treatment of the recreational discard selectivity has less affect, with the scenario using true selectivity from the OM performing similarly to the corresponding scenario with the same fishing mortality treatment (i.e., ***B2 Sel*** is more similar to ***Base*** and ***B2 Sel& Tru Fs*** is more similar to ***Tru Fs***). Once the time series of fishing mortality estimates ends (2004), selectivity misspecification affects become more apparent. Scenarios with true recreational discard selectivity (***B2 Sel*** and ***B2 Sel&Tru Fs***) have less trending in performance and the bias in the beginning of the projection period when fishing mortality ramps up is less than in the scenarios with misspecified selectivity. The configurations with no misspecified inputs (***B2 Sel&Tru Fs***) and, surprisingly, with both misspecified inputs (***Base***) perform about the same during the beginning of the projection period (Figure 184). Later in the projection period performance is more consistent through time across scenarios, but treatment of these inputs still impacts estimation of stock scale and bias. The ***Base*** scenario continues to estimate with the greatest accuracy in the long term followed closely by the ***B2 Sel&Tru Fs*** configuration. Models with one misspecification used in isolation (***B2 Sel***, ***Tru Fs***, ***No Fs***) are the least accurate performers. Notably, performance deteriorates when the fishing mortality information is removed from the fitting process (***No Fs***) and provides the most biased estimates of all scenarios across the projection period.

Due to the mixed performance across these scenarios, sources suggesting similar misspecification using the Bacheler et al. 2008 estimates in the northern SCA EM for the *in situ* stock, and lack of alternative external fishing mortality estimates to use in place of the Bacheler et al. 2008 estimates, the Bacheler et al. 2008 inputs were included in the EM configuration

used in the core population dynamics scenarios and are assumed to be representative of misspecification that would occur in the next benchmark assessment of the *in situ* stock.

7.2 Core Population Dynamics Scenarios

7.2.1 Structure of Results

Initially, performance metrics summarized across the projection period were the focus for evaluating performance among the candidate EMs. However, there were trends in performance within the projection period that were important to consider when evaluating the summarized results (e.g., differing projection periods based on each stock's longevity which complicated the time-varying performance). Therefore, the projection period was summarized in two periods, the initial years when fishing mortality was set to ramp up across scenarios (Ramp period, 2020-2034) and the years after this Ramp period (Post-Ramp period, 2035-2082 for the northern stock and 2035-2061 for the southern stock). This summarization standardizes the number of years for the Ramp period between stocks, making performance evaluations between stocks more comparable. Performance metrics across the EM time series are presented, but performance during the Ramp period was considered the priority for performance evaluations as it is an indication of EM performance during considerable changes to stock conditions. In addition, the ramp period is closest temporally to the historic period and these years will be the focus in the upcoming benchmark stock assessment.

Results are presented for all parameters originally identified in Section 6.1, but there was also a clear need to refine results from all original parameters in decision tables to guide recommendations. Eight parameters were identified as the highest priority parameters for performance evaluation including recruitment condition, SSB status, three year average SPR ratios, three year average SPR status, three year average fishing mortality ratios, three year average fishing mortality status, age-4 escapement, and age-6 escapement. These variables place a heavy emphasis on fishing mortality estimation, but also prioritize performance for categorization of production and reproductive capacity. Absolute scale of stock abundance (age-1 recruitment, sub-adult abundance, mature abundance) was considered a lower priority given the fisheries are predominately recreational and managed without catch caps or quotas. Three year average ratios were prioritized because they were estimated with better accuracy, precision, and error rates than their annual counterparts (Figure 185-Figure 192).

Relative error was converted to absolute values before calculating medians across the Ramp period in each scenario to avoid canceling runs of relative error of opposite directionality within this period. These scenario-specific medians were then averaged across scenarios to summarize performance for numeric variables in decision tables. Type II error rates, where the stock was in poor condition and the model incorrectly identified it as good condition, were considered higher priority given they present more risk to the biological condition of the stock and were tallied across scenarios during the ramp period to summarize performance for categorical variables in decision tables. Performance was often worse for scenarios with misspecification of natural mortality (***Miss M***) and recruitment dynamics (***Depr R***) and there is some anticipation that this misspecification could be identified during a benchmark stock assessment. Therefore, two summary tables are included for the results, one summarizing all core population dynamics

scenarios and one summarizing core population dynamics scenarios excluding the ***Miss M*** and ***Depr R*** scenarios. Results are presented by stock as well as across stocks, although differences in performance between stocks suggested focusing on results by stock for recommendations.

During review of preliminary results, it became apparent that EMs in some cases were performing better at estimating trends of population parameters given relative error distributions that were biased, but consistently biased through time. Trend-based estimates using ad hoc time period-based reference points have been used for management of other species (ASMFC 2003, ASMFC 2017a) and so performance for trend estimation is also presented as information that could support a potential alternative to current management of red drum stocks under SPR reference points. Trend-based values were calculated by selecting a reference period and dividing the annual parameters by the average of the parameter over the fixed reference period. Relative error of these scaled parameters was then calculated and summarized the same way as for absolute parameters by comparing the OM values to the EM estimates. Trend estimation performance is dependent on reference period choice, so results for two reference periods are included. The first reference period is one year selected at random from the time series (2007). The second reference period was selected as a five year period with an average SPR in the northern OM equal to the current management target ($SPR_{40\%}$, 2008-2012). There was variability in annual SPR in the northern OM during this reference period and a trend in the southern OM, so this was considered an ideal period of mixed conditions used for the reference period as a test of robustness in trend estimation.

7.2.2 Northern Stock Results

Convergence rates for the SS and SCA northern stock EMs were generally high across core population dynamic scenarios. The SS EM converged on a solution for all iterations in most scenarios with the exception of the ***Depr R*** scenario (64% convergence) and the ***Miss M*** scenario (90% convergence; Table 72). The SCA EM experienced slightly lower convergence rates which ranged between 86 – 95% (Table 72).

The SCA EM estimated parameters with significant bias in the historical period due to the inclusion of misspecified fishing mortality data identified in the previously discussed developmental scenarios (Figure 193-Figure 201). This EM then compensates and estimates with improved accuracy after the time series of these fishing mortality data end in 2004. Precision follows an opposite pattern, with very precise estimates during the period when fitting to fishing mortality data followed by lower precision when these data end. Despite the decrease in precision, the SCA EM tends to estimate with greater precision than the SS EM throughout the assessment time series including during the Ramp period (Table 73 and Table 74). This is particularly noticeable for age-1 recruitment estimates which are estimated very imprecisely by the SS EM (Figure 193). The SS EM generally estimates fishing mortality-based parameters that are influenced by the full age range (SPR and F ratios) with more accuracy during the ramp period than the SCA EM, while the SCA EM estimates fishing mortality-based parameters that only include information on the younger ages (escapement) more accurately (Table 75 and Table 76).

Another notable performance feature for both EMs is trends in bias of the fishing mortality-based parameters, particularly during periods when stock conditions change the most. Bias tends to increase as fishing mortality increases and decrease as fishing mortality decreases (Figure 202). This patterning is more pronounced and consistent for the SCA EM than the SS EM. Bias is more stable during periods of stable fishing mortality. There is less trending in abundance-based estimates, but some trends do occur for the SCA EM mature abundance estimates (Figure 203).

The SCA EM tends to underestimate abundance parameters characterizing the immature component of the stock (Figure 193 and Figure 194) and overestimate mature abundance (Figure 195). Following a similar pattern, the SCA EM tends to overestimate fishing mortality-based parameters with information on the youngest ages only (i.e., underestimate age-4 escapement-Figure 197) and underestimate fishing mortality-based parameters influenced by the full age range during the period following the fishing mortality data time series (F ratio-Figure 200, i.e., overestimate exploitation- Figure 199 and SPR-Figure 201). Age-6 escapement (Figure 198), which includes information on some intermediate ages, appears to be a relatively well-estimated transitional parameter as the model moves from a tendency to overestimation to a tendency to underestimation. The SS EM estimates with more random bias across scenarios than the SCA EM.

The TLA EM consistently estimates lower error rates than the SS EM for recruitment conditions (Figure 204). The TLA EM produces higher type II error rates than type I error rates indicating a tendency to overestimate recruitment. Error rates are evenly split between type for the SS EM in the scenarios except ***Miss M*** and ***Depr R*** indicating overall accuracy, but low precision. Notably, the SS EM produces higher type II error rates in the ***Depr R*** scenario indicating a bias as would be expected with misspecified recruitment dynamics, but the TLA EM, with its time period-based reference point, performs just as well or better than in other scenarios.

Error rates in SSB status estimates show patterns dependent on the EM's bias tendencies. For example, the SCA EM, which tends to overestimate mature abundance, estimates SSB status with increasing type II error as the stock becomes overfished in a higher frequency of iterations at the end of the Ramp period (Figure 206). Error rates then decrease as the stock starts trending back towards a not overfished status (e.g., ***Base*** scenario) or continues trending to a more depleted abundance (e.g., ***High F*** scenario). The SS EM, which tends to underestimate mature abundance in scenarios like the ***Inc Sel*** scenario, estimates with increasing type I error rates as the stock trends towards, but just before entering into, an overfished status early in the Ramp period and as the stock moves from an overfished status to a not overfished status after the Ramp period. The SCA EM collectively produces the lowest type I error rates for SSB status estimates, but the highest type II error rates across scenarios during the Ramp period (Table 75 and Table 76). The SS EM produces the lowest type II error rates during the Ramp period and these rates further decline when excluding the ***Miss M*** and ***Depr R*** scenarios. The TLA EM included four characteristics as potential indicators of SSB status, but the adult abundance characteristic consistently outperformed the other candidate characteristics for type II error rates (Figure 205). This characteristic was chosen as the final characteristic for comparison to other EM SSB status error rates and is the intermediate performer, producing error rates between the other EMs (Table 75 and Table 76).

Similar to patterns in SSB status error rates, the SCA EM, which tends to underestimate F and SPR ratios, produces high type II error rates for these status determinations. These error rates peak as the stock moves between statuses and decline as the model "catches up" with the correct status when fishing mortality trends in the same direction for additional years (Figure 207 and Figure 208). Error rates become more stable as the stock moves into more stable fishing mortality regimes in the Post-Ramp period. The other EMs follow similar patterns in error rates and the TLA EM produces the highest type II error rates during the Ramp period, while the SS EM produces the lowest type II error rates from its more accurate ratio estimates (Table 75 and Table 76).

Despite often more accurate trend-based abundance estimates (Figure 209 and Figure 210), the varying magnitudes of bias in fishing mortality-based estimates through time caused mixed results for performance of trend-based estimates (Table 77-Table 84,Figure 211 and Figure 212). The biggest improvements in average median relative error occurred for the fishing mortality-based estimates influenced by the full age range (SPR and F ratios) when using a multi-year reference period (Table 81). Reductions in relative error ranged from 3%-8%. However, relative error of trend-based escapement estimates tended to increase with increases as much as 14%. Precision also tended to decrease for the trend-based estimates.

7.2.3 Southern Stock Results

The SS EM converged on a solution for most iterations (Table 72). The SCA EM experienced lower convergence rates than the SS EM with rates as low as 67%. Notably, the SCA EM experienced its highest convergence rate for the ***2023 Term Yr*** scenario (92%).

The SS EM generally estimates with slightly greater precision than the SCA EM during the Ramp period, while the SCA EM estimates with greater accuracy (Table 73-Table 76). The SS EM estimates age-1 recruitment very imprecisely relative to other parameters (Figure 193). The SCA EM and SS EM tend to overestimate abundance for all components of the stock and underestimate fishing mortality-based parameters.

There is some trending in performance as stock conditions change. The trending for SPR ratios is less pronounced and consistent across scenarios for the southern SCA EM than was seen in the northern SCA EM, and similar between southern EMs (Figure 213). There is also no noticeable trending for mature abundance estimates (Figure 214) as was seen in some scenarios for the northern SCA EM.

The TLA EM consistently estimates lower error rates than the SS EM for recruitment condition (Table 75 and Table 76, Figure 215). The TLA EM produces higher type II error rates indicating a tendency to overestimate recruitment. Error rates are evenly split between type for the SS EM in all scenarios except ***Depr R*** indicating overall accuracy, but low precision. The SS EM appears to rely more on the final recruitment dynamics in the ***Depr R*** scenario than it does in the northern stock, as it overestimates recruitment to a greater degree in earlier years (i.e., higher type II error rates than other scenarios) and improves later in the time series once the stock has entered the lower recruitment regime. The TLA EM, again with its time period-based reference point, performs just as well or better for the ***Depr R*** scenario than in other scenarios.

As for the northern stock, the adult abundance characteristic consistently outperformed the other TLA EM SSB status characteristics for type II error rates and was chosen as the final characteristic for comparison to other EM SSB status error rates (Figure 216). All EMs perform similarly for SSB status estimates during the Ramp period (Table 75 and Table 76). The SCA and SS EMs' tendencies to overestimate abundance result in higher type II error rates than type I error rates. Error rates increase as the stock moves from one SSB status to another as the EMs "catch up" with additional years of trending abundance (Figure 217).

Trends in fishing mortality status error rates show similar patterns as for SSB, peaking as the stock moves from one mortality status to another and declining as mortality continues trending in the same direction or stabilizes (Figure 218 and Figure 219). The tendencies of the SCA EM and SS EM to underestimate fishing mortality result in higher peaks of type II error rates than type I error rates across the time series. Error rates for TLA EM fishing mortality status estimates follow similar patterns, but this EM produces the lowest type II error rates across scenarios during the Ramp period (Table 75). When excluding the ***Miss M*** and ***Depr R*** scenarios, the SCA EM and SS EM type II error rates for mortality status estimates decrease and the SCA EM produces the lowest error rates (Table 76).

The tendency for southern EMs to estimate parameters with bias, but more consistent bias through time than seen in the northern stock results in improved performance at trend-based estimation. There is generally lower relative error for trend-based abundance (Figure 209 and Figure 210) and fishing mortality (Figure 211 and Figure 212) estimates across scenarios and EMs in the southern stock. Relative error decreases by as much as 13% and standard deviation of relative error decreases by as much as 6% (Table 77-Table 84). There were slightly greater accuracy improvements when combined over all core population dynamics scenarios and when using a multi-year reference period, but improvements occurred in all cases. The only case of worse performance was for precision of the SS EM estimates of three year fishing mortality ratios.

7.2.4 Summary Across Stocks

The SS EM convergence rates were generally higher and more consistent between stocks than the SCA EM (Table 72). The SCA EM generally had lower convergence rates for the southern stock than the northern stock.

Performance metrics for the SCA EM and SS EM in both stocks generally improved when the ***Miss M*** and ***Depr R*** scenarios were excluded. There was little change for the TLA EM. However, qualitative pairwise comparisons of EMs within stocks were similar between the two groupings of scenarios. The only changes occurred in the southern stock with the best performer for fishing mortality status and age-4 escapement changing from the TLA EM to the SCA EM and the SCA EM to the SS EM, respectively.

The EMs estimating numeric parameters performed differently relative to each other between stocks. The SS EM tended to estimate with less precision and greater accuracy than the SCA EM in the northern stock, while the SS EM tended to estimate with greater precision and less accuracy than the SCA EM in the southern stock. The more accurate EMs for each stock estimated parameters with similar accuracy (absolute relative error ≈0.1-0.2), except age-6

escapement which the southern SCA EM estimated with lower accuracy than the northern SS EM. Age-4 escapement was estimated with very similar accuracy among stocks, EMs, and grouping of scenarios. Precision for this parameter, however, varied with greater precision in the southern stock. The southern EMs tend to estimate most parameters more similarly than the northern EMs.

The EMs estimating recruitment condition performed similarly between stocks, with the TLA EM performing considerably better (type II error rates <14%) than the SS EM (type II error rates >25%). Performance estimating other categorical variables varied between stocks. There was clear separation in performance for SSB status in the northern stock with the SS EM performing best, the TLA EM being an intermediate performer, and the SCA EM performing worst. There was less separation between EMs in the southern stock, all producing type II error rates within a percentage point of each other. Southern EMs performed better than northern EMs, all producing error rates lower than the best performer in the northern stock (6%). The EMs tended to estimate mortality status with similar error rates across stock, with the exception of the northern TLA EM which estimated with considerably higher error rates (>40%). The EMs estimating with more accuracy also performed best for mortality status determinations.

The other key differences between stocks was the greater tendency of northern EMs to estimate parameters with varying accuracy through time, including decreasing accuracy during periods of rapidly changing population dynamics. This trending resulted in little to no gains when using the models for trend-based estimates, while southern EMs could provide improved performance with trend-based estimates.

7.3 Alternative Structural Scenarios

Three additional scenarios were conducted following the core population dynamics scenarios to address specific questions about stock-recruit relationship parameterizations in the SS EMs and growth assumptions in the SCA and SS EMs.

7.3.1 Time-Varying Stock-Recruit Relationship

One of the results of the ***Depr R*** core population dynamic scenario was that the SS EMs for both regions were found to estimate the SSB ratios with considerably high imprecision and bias (Figure 196), indicating some form of model misspecification was occurring. However, impacts to other parameters were mostly to scale, causing shifting bias with little impacts to trend or precision. The bias and imprecision of the SSB ratio estimates was found to be caused by abnormally low values estimated for the steepness parameters as the models tried to compensate for the underlying change in productivity. In the northern stock, the median estimated value of steepness across converged iterations (64%) was 0.47, while in the south, the median estimated value across converged iterations (98%) was 0.66. The median estimated value of the ln(R0) parameter for the northern region was 7.31 while the median estimated value of the ln(R0) parameter in the south was 8.99. For both regions, the derived estimates of $SSB_{30\%}$ (i.e., the denominator of the SSB ratio) across converged iterations were found to sharply decrease with declining estimates of steepness and thereby created the wide-ranging imprecision and bias to the SSB ratios.

To explore this further, a scenario with the northern SS EM was configured to allow for time-varying R0 (***Time-Var R***) to evaluate if building in this added complexity would improve performance for estimating the SSB ratios. As expected, the precision and bias were greatly improved when this complexity was added (Figure 220) as it more resembled the configuration of the OM. Convergence rates increased to 100% and the median estimated value for steepness increased to 0.82. The median estimated value of the ln(R0) parameter in the first time block (years 1989 – 2029) was 6.97 and declined to a median estimated value of 6.30 in the final time block (years 2030 – 2082). Given these results and the constraints of time and resources, the TC and SAS did not find it necessary to explore this configuration with the southern stock as the effect was assumed to be similar.

7.3.2 Steepness

The SS EMs estimated stock-recruit relationships, including the steepness parameters, which represents a key structural difference from the other EMs which do not have explicit stock-recruit relationships. A scenario was therefore conducted to evaluate changes to performance of the SS EMs when the recruitment dynamics were configured to be more similar to the SCA EMs. Using the ***Base*** scenario SS EMs for both regions, the steepness parameters were fixed at 0.99 and recruitment deviations were no longer constrained to sum to zero (***Base h***). This change to the EM configurations had impacts to the scale and precision of the SSB ratios (Figure 221), but little impact to trend of these estimates and negligible impacts to other parameters (Figure 222). Impacts to SSB ratios depended on bias of the ***Base*** scenarios, resulting in more biased estimates for the northern stock and less biased estimates for the southern stock.

7.3.3 Growth

Characterizing red drum growth (see Section 2.3) presents unique challenges which contributed to the decision to knowingly misspecify growth (i.e., using the von Bertalanffy growth model) and subsequently, natural mortality in the EMs. A scenario was conducted where the true growth and natural mortality from the OM was passed to the EMs (***Tru Grow&M***). The objective was to help determine the level of priority given to growth modeling and specification in the upcoming benchmark stock assessment. The TC and SAS were interested to see whether the performance results would suggest parameters from a more objectively developed non-traditional growth model (e.g., von Bertalanffy growth model with age-specific k using a model selection process) for use in the SS and SCA EMs would be worth the dedicated time and resources to pursue in the upcoming benchmark stock assessment. True natural mortality was included in this scenario due to an underlying assumption that natural mortality was inversely related to fish length; thus, changes to fish length-at-age merited changes to the natural mortality-at-age dependent on those growth assumptions.

In the northern stock, the misspecified growth in the ***Base*** scenario resulted in fish estimated to weigh more for ages between about 8 to the mid-20s and then estimated to weigh less for ages greater than about 25 years when compared to the ***Tru Grow&M*** scenario (Figure 223). Differences in natural mortality-at-age were primarily observed as lower natural mortality at age-1 and slightly higher natural mortality for ages greater than about 30 years. (Figure 224). In the southern stock, the results of misspecified growth were slightly heavier fish around age 10

which were then estimated to weigh less at ages greater than 15 years (Figure 225). The natural mortality-at-age for fish in the southern stock ***Base*** scenario was estimated to be similar to the natural mortality-at-age in the ***Tru Grow&M*** scenario with slightly lower mortality observed at age-1 and slightly higher mortality observed at ages greater than 25 years (Figure 226).

The use of true growth and natural mortality had relatively little impact on performance of the SCA EMs. The bias improved slightly for the southern SCA EM while there were relatively indistinguishable impacts on the northern SCA EM (Figure 227). However, larger impacts were observed in the SS EMs, especially in the southern stock where scale estimation became more positively biased (Figure 227) compared to the ***Base*** scenario. This was perhaps due in part to the estimation of a larger virgin stock size (i.e., larger SSB_0 and R0 parameters) which allowed for the perpetuation of increased biomass throughout the time series. In the northern stock, the ***Tru Grow&M*** configuration improved precision of the SS EM performance but did not impact scale estimation as observed in the southern stock, resulting in smaller and mixed impacts throughout the time series.

7.4 Data Prioritization Scenarios

7.4.1 Longline Data Time Series

The sub-scenarios conducted to evaluate effects of changing longline survey data time series (***No LL***, ***15 yrs LL***, ***30 yrs LL***, ***45 yrs LL***, ***60 yrs LL***) only impacted the northern SCA EM performance when the earliest years of the survey were excluded from the data set (2007-2022, Figure 228 and Figure 229). The incorrectly estimated exponential decline of mature abundance does not occur when these early data are removed from the time series. Similar effects were seen in the developmental scenarios when removing misspecified fishing mortality data from the model. This suggests the effects seen here are likely an interaction between the earliest longline data and the Bacheler et al. 2008 inputs to the model. This conflict with the Bacheler et al. 2008 data could come from either the fishing mortality estimates input as data, which would contain information on the cohorts that would have recruited to the longline survey in the first few years of its operation, the fixed recreational discard selectivity, or both. Despite the more accurate estimates of the historical population dynamics, sub-scenarios without the earliest longline data resulted in increased bias throughout the projection period which is of highest priority in future stock assessments. Further reductions of the time series had negligible impact on performance. Impacts to the northern SS EM mostly occurred for estimation of the historical population dynamics (Figure 228 and Figure 229). As the data time series is shortened, the historical estimates become increasingly biased. Bias in later years changes slightly across sub-scenarios indicating changes in scale estimates, but in no systematic pattern.

In the southern stock, there are similar trends in bias between EMs as the data time series is shortened (Figure 230 and Figure 231). Relative error decreases as the time series is shortened, but at a greater magnitude for the SCA EM. This pattern indicates a decrease in estimates of scale as the longline times series is shortened. The SCA EM estimates with more imprecision as the time series is shortened. The longline data also improve the SCA EM's performance at estimating the trend in abundance during the ramp period. Without the longline data during

this period (***No LL***, ***15 yrs LL***), the EM estimates a more biased depletion and a more positively biased rate of recovery (Figure 230). There were similar impacts to the SS EMs between stocks in that the historical estimates show more trend in bias as the time series is shortened. However, due to the southern SS EM's tendency to overestimate mature abundance, the bias of the historical estimates is actually trending towards less bias.

7.4.2 Recreational Discard Composition Data

Sub-scenarios dealing with changes to recreational discard composition data impacted the scale, and, therefore, bias of estimates from the northern EMs (Figure 232 and Figure 233). These impacts generally reflected a negative relationship between composition data and estimated bias. The addition of imprecise sampling data resulted in more biased estimates and the addition of precise sampling data resulted in a further increase to bias. Trends in bias were similar with the exception of the SCA EMs that retained the fishing mortality data inputs with the composition sampling data (***B2 Dat*** and ***Prec B2 Dat***). These configurations reduced trending in bias of SPR ratios during the ramp period that was seen in configurations without composition sampling data (***Base***) or without fishing mortality data (***B2 Dat&No Fs*** and ***Prec B2 Dat&No Fs***). Increases in data precision did result in increases to precision of estimates. Aside from the impact to population parameters, the composition data does impact accuracy of recreational discard selectivity estimates (Figure 234-Figure 236). Estimates improve as composition data are added (particularly for older ages in the SS EM -Figure 235) and then become more precise (particularly for the SCA EM –Figure 236).

In the southern stock, changes to data precision also impacted scale estimation, but the impact was far greater for the SCA EM than the SS EM (Figure 233 and Figure 234). Both EMs estimated a smaller stock and the SCA EM shifted to a negative bias for abundance parameters and a positive bias for fishing mortality-based parameters (i.e., negative bias for SPR-Figure 233). As with the northern EMs, precision of estimates increased as data precision increased. There were also some improvements to selectivity estimates as composition data precision increased (Figure 237 and Figure 238), most notably from the SS EM for the SC_Recreational fleet (Figure 238).

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Assessment Methodology

8.1.1 Recommended Approach to Characterizing Stock Status in Future Benchmark Assessment

For the development of recommended approaches to characterize red drum stock status in future benchmark assessments, we used the performance of our EMs (TLA, SCA, and SS EMs) for each stock as measured using a suite of performance metrics (see Section 7.2), focusing on eight parameters identified as the highest priority parameters for performance evaluation (recruitment condition, SSB status, three-year average SPR ratios, three-year average SPR status, three-year average fishing mortality ratios, three-year average fishing mortality status, age-4 escapement, and age-6 escapement). The evaluation was conducted primarily using our

core population dynamics scenarios (***Base***, ***High F***, ***Inc Sel***, ***Miss M***, ***Depr R***, and ***2023 Term Yr***) developed from the OM, however we used the totality of the scenarios explored (e.g., developmental scenarios (see Section 7.1), core population dynamics scenarios (see Section 7.2), alternative structural scenarios (see Section 7.3), and data prioritization scenarios (see Section 7.4) to inform our overall conclusions. Full descriptions of the results from these scenarios can be found in Section 7 – herein we summarize major conclusions based on the totality of the results from the EMs. Due to differences in performance of the considered EMs between stocks, we developed stock specific recommendations for characterizing stock status in future benchmark assessments. These recommendations should guide workloads and preparation for the upcoming benchmark, though, ultimately, the preferred approach will depend upon fits to the observed data from *in situ* stocks available in the benchmark.

8.1.1.1 Northern Stock

For the simulated northern stock of red drum, our analyses identified concerns with specific EMs, leading to recommendations on appropriate models for consideration during the upcoming benchmark stock assessment. In general, we recommend pursuing both the SS and TLA assessment approaches in the upcoming assessment for the northern stock of red drum; we do not recommend further pursuing the SCA model for the northern stock.

Statistical Catch-at-Age

The SCA had two identified and concerning deficiencies detracting from its use as an assessment model for the northern stock, namely its sensitivity to weighting scheme and reliance on Bacheler et al. (2008) tag-based data inputs. The model was impacted substantially by both factors, as evidenced by substantial changes in model results obtained via different developmental scenarios (Section 7.1). Although the model estimated parameters in the core population dynamics scenarios with reasonable and even superior precision, this precision was driven by external fishing mortality inputs and often centered around the most biased performance of northern EMs.

Despite these concerns, the northern SCA, as parameterized during ASMFC 2017b, will be updated in the upcoming stock assessment as a continuity run. Beyond its use as a continuity run, we do not recommend further model development or a continuation of development for this model after the upcoming benchmark assessment for the northern stock.

Stock Synthesis

We recommend focusing on and developing a length- and age-structured SS model for the benchmark stock assessment of the northern stock to characterize stock status. The SS model generally performed as well or better than the other northern EMs in terms of accuracy. Additionally, the SS model performs relatively well under the ***2023 Term Yr*** scenario. This is indicated by a general lack of a decrease in precision of the SS model under the ***2023 Term Yr*** scenario relative to the ***Base*** scenario. This provides more confidence in obtaining stock status information from such a model developed during the upcoming benchmark stock assessment.

The SS model is more flexible, providing a benefit to the assessment of red drum which has unique fishery and life history characteristics that pose challenges to traditional statistical

catch-at-age models, particularly in cases like that seen here where the SCA depends on external fishing mortality inputs. The increased flexibility of the SS modeling approach also means it can incorporate additional red drum data sets not considered here, like tag-recapture data available from North Carolina and Virginia. The potential improvement in stock status determination and precision of stock status estimates via the incorporation of such data could not be evaluated herein due to limitations of the OM used to simulate the stocks.

Traffic Light Analysis

Our investigation of the TLA suggests there is utility in continuing to develop it as a potential assessment methodology for red drum. For the northern stock, it is comparable to the SS EM in making spawning stock biomass status determinations, and generally outperforms SS when characterizing recruitment condition. Hence the TLA shows utility as a supplementary, alternative assessment approach for development of SSB status and recruitment condition determinations. Such development should occur simultaneously with the SS model in the upcoming benchmark assessment. An additional benefit of further TLA model development is its relative ease to update; this suggests a TLA approach could be used during interim periods between formal assessments to update stock status for management advice. However, we do caution the use of the TLA for fishing mortality status determinations in the northern stock, due to its poor performance in terms of error rates.

8.1.1.2 Southern Stock

For the simulated southern stock of red drum, our analyses continued to identify concerns with individual EMs, though the overall similar performance (in terms of bias and precision) of all three EM approaches leads to our recommendation that all should be pursued in the upcoming benchmark stock assessment.

Statistical Catch-at-Age

The SCA continues to show sensitivity to changes in weighting schemes, with weighting affecting mostly convergence rates. However, compared to the effect changing weight had on the SCA for the northern stock, the change in weighting had less of an effect on scale estimation and generally did not affect the trend of estimates for either stock. Also, it is unclear at this point if the weighting in a future assessment would focus on the previously used weighting hypotheses or instead change to another method (e.g., Francis 2011).

Given this difference in the southern stock SCA model relative to the northern stock SCA model and its similar to slightly better performance overall relative to the other southern EMs, our recommendation is to continue pursuit of this model in the upcoming benchmark assessment. It's important to note that the results here indicate performance of this model for estimating the spawning stock biomass status is comparable to the other assessment approaches for the southern stock, despite this model being viewed as only applicable for sub-adult parameters coming into this assessment. Our recommendation of pursuing this model includes for adult-based estimates.

One caution was indicated by the results for this model that should be considered in the upcoming benchmark assessment. Though precision of the SCA estimates was reasonable and

comparable to the other considered EM approaches when evaluated for the full simulated time series, precision drastically decreased under the ***2023 Term Yr*** scenario. This is similar to the situation noted during the ASMFC 2017 benchmark stock assessment and would likely be the experience during the upcoming benchmark stock assessment. However, the results also indicate this deterioration of precision is far worse for estimates on their absolute scale, while not as severe for scaled, trend-based estimates of fishing mortality-based parameters (Figure 239) or not an issue for trend-based estimates of abundance parameters (Figure 240). The model is more robust for trend estimation and use of trend-based estimates could offer a potential mitigation to this issue if experienced in the upcoming benchmark assessment. Converse to the deteriorating precision, the convergence rates of the southern SCA for the ***2023 Term Yr*** scenario actually improved relative to the ***Base*** scenario and offer indication of a stable model.

During the benchmark assessment, the southern SCA, as parameterized during ASMFC 2017b, should be updated as a continuity run. Note however the SCA configuration herein employed for the southern stock differs from this configuration, in that the Florida recreational discard selectivity is fixed and not estimated, and we recommend pursuing the configuration presented in this simulation assessment for consideration as the preferred approach in the benchmark.

Stock Synthesis

We continue to recommend development of the southern SS model during the benchmark stock assessment to characterize stock status. Relative to the southern SCA EM, the southern SS EM generally estimated with slightly greater precision during the Ramp period, though the SCA EM estimated with greater accuracy. Further, the SS model remains a more flexible assessment platform, which should be a benefit to the assessment of the southern stock of red drum with its unique fishery and life history characteristics that pose challenges to traditional statistical catch-at-age models. Similar to the northern stock, the increased flexibility of the SS modeling approach also means it can incorporate additional red drum data sets not considered here, like tag-recapture data available from South Carolina and Georgia. As noted above, the potential improvement in stock status determination and precision of stock status estimates via the incorporation of such data could not be evaluated herein due to limitations of the OM used to simulate the stocks.

Traffic Light Analysis

Similar to the northern stock, our investigation of the TLA suggests there is utility in continuing to develop it as a potential assessment methodology for red drum. The southern stock results indicate the TLA is useful for all metrics, including fishing mortality status which was deemed unreliable using the TLA for the northern stock. Further, error rates in stock status in terms of fishing mortality status and SSB status are comparable to both the SCA and SS EMs for the southern stock and the TLA continues to outperform the age-structured models in characterizing recruitment condition. Hence the TLA shows utility as a supplementary, alternative assessment approach for development of fishing mortality status, SSB status and recruitment condition determinations. Such development should occur simultaneously with the other models in the upcoming benchmark assessment. An additional benefit of further TLA model development is its relative ease to update; this suggests a TLA approach could be used

during interim periods between formal assessments to update stock status for management advice.

8.2 General Recommendations

Our investigation suggests the SS estimation of steepness may prove useful as a diagnostic tool (see Section 7.3.2) in the benchmark stock assessment. We recommend trying to estimate steepness initially and upon initial investigation, if unexpected values of steepness are estimated, it may be indicative of changes in stock productivity through time or other model conflicts. If unexpected steepness is estimated, additional work should be done to diagnose what may be driving the unexpected evidence of steepness and the model can be modified to address the issue or steepness can be fixed if the cause cannot be diagnosed.

Despite the recommendation to pursue the SS EM in the upcoming benchmark stock assessment, the model was unsuccessful at characterizing recruitment condition due to high levels of variability around the estimates. We advocate not using the SS model to develop management advice based on recruitment condition. However, the results of the simulation assessment suggest output parameters available via SS can be used for stock status determination, including metrics related to spawning stock biomass and spawning stock biomass status which have been unavailable during previous assessments of red drum.

Finally, it became apparent during the review of the results that models, specifically for the southern stock, generally provided accurate trends in F, SSB, and recruitment. As such, this suggests a potential alternative management approach for red drum could be developed based on trends and levels relative to a reference time period. This is similar to the approach used for the development of stock status recommendations for the ASMFC-managed Atlantic menhaden (ASMFC 2017a). Work would be needed to define an appropriate time period to develop such a set of reference points, including input from the Board.

8.2.1 Recommendations for Future Simulation Analyses

We provide a recommendation to explore the cause for trends in bias of models during periods of big changes in stock dynamics. Such trends were associated with large changes in fishing mortality in our core population dynamics scenarios, leading to changes in performance for estimating stock status. During these periods, we generally see changes in accuracy of parameters. Such changes are troubling from a management perspective, as it is generally during these real world shifts in stock dynamics that it is most crucial to obtain accurate and precise estimates of stock status. One possible means to investigate this would be to develop an OM that outputs very precise data for incorporation into the EM models. The hope is this would allow analysts to investigate whether the causes of bias are due to structural issues with the EMs or a data issue.

8.3 Prioritized Recommendations on Future Monitoring to Improve Assessment

A final objective of the simulation assessment was to conduct a number of scenarios to evaluate potential data prioritizations that could improve the accuracy and precision of stock status estimates under various assessment approaches. These scenarios included evaluating the

length of the adult longline survey time series, changes in recreational discard composition data availability and quality, and impacts of growth misspecification.

Adult Longline Survey

Based on these sub-scenarios, at this time we do not recommend any changes to longline survey operations across the coast. Though the SCA and SS models generally seemed to be insensitive to the longline index overall, the longline index is essential to the application of the TLA analysis for SSB status determination. In addition, further simulation analyses should be conducted before making any recommended changes to longline surveys. Examples of additional simulation analyses include a peel of the longline survey in the other direction, ending the survey prior to the terminal year of the assessment. This could help answer the question of how a future loss of the longline survey data could impact assessment results.

Recreational Discard Composition Data

A data deficiency thought to impact the uncertainty of status determinations in previous assessments has been the lack of robust recreational discard length- and age-composition information. This is particularly pertinent to a species such as red drum, whose fisheries are primarily recreational in nature with a large component of annual fishery related mortalities being due to catch-and-release. The improvements to recreational discard composition data indicated general improvements to precision of parameter estimates and improvements for selectivity estimation for this increasingly important component of the catch (see Section 7.4.2) and strongly supports the collection of these data. However, further analyses need to be completed to determine compensation effects resulting in changes to scale estimation, and therefore bias, and impacts elsewhere when the models are constrained by more precise data.

Growth Misspecification

A lot of time and effort has been expended in past assessments to try and accurately describe the growth pattern of red drum throughout their life, leading to the development of age-specific K growth models in this assessment. This is because pursuing statistical growth models to provide fixed or starting values for assessment models is generally seen as a useful endeavor in stock assessments. However, results of the scenario evaluating growth misspecification (***Tru Grow&M****)* had little impact on EM performance in most cases and negative impacts on the southern SS EM (i.e., increased bias). These results imply development of non-traditional, custom growth models external to the assessment models is a lower priority in the upcoming benchmark stock assessment. While likely efforts would improve the assessment product, because of the anticipated workload and competing priorities and general insensitivity of the EMs under different growth model assumptions, it is anticipated greater improvements can be gained by focusing efforts on other data streams, such as index development, recreational discard compositions, and tag-recapture data (see below).

Tag-Recapture Data

As noted above, a limitation of the OM models was their inability to generate tag-recapture data sets mimicking those readily available for assessment approaches. SS has the ability to directly incorporate such tagging information into assessment models to improve estimates of

stock status, with such exploration of the incorporation of tagging data in red drum assessments being explored during both SEDAR 44 (SEDAR 2015a) and the South Carolina state-specific assessment (Murphy 2017). Because of the limitations of the ss3sim package, the impacts of tagging data incorporation, which *a priori* would be expected to improve accuracy and precision of status determinations, could not be evaluated. However, there is an expansive tag-recapture data set available for both the northern (North Carolina and Virginia data sets) and southern (South Carolina and Georgia data sets) stocks of red drum. As such, incorporation of these data sets into the next benchmark stock assessment should be considered a high priority.

9 REFERENCES

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10 TABLES

Table 1. Red drum regulation timeline by jurisdiction for the northern stock.

Year	New Jersey	Delaware	Maryland	Potomac River	Virginia	North Carolina
Pre-1960	No Regulations	No Regulations	No Regulations	No Regulations	No Regulations	No Regulations
1960						
1971						
1973						
1976					2 fish allowed >32" TL person^{-1} day^{-1}	
1978						
1985						
1986					14" TL MLL; 2 fish >32" TL person^{-1} day^{-1}	14" TL MLL; 2 fish >32" TL person^{-1} day^{-1}
1987						
1988						
1989						
1990				14" TL MLL		14-32" TL slot limit; 1 fish >32" TL; 5 fish person^{-1} day^{-1} recreational; 250,000 lb commecial cap
1991			14" TL MLL; 2 fish >32"TL person^{-1} day^{-1}			18-32" TL slot limit; 1 fish >32" TL; 5 fish person^{-1} day^{-1} recreational; 250,000 lb commecial cap
1992						
1993						18-27" TL slot limit; 1 fish >27" TL (no sale); 5 fish person^{-1} day^{-1} recreational; 250,000 lb commecial cap
1994				18" TL MLL; 1 fish >27" TL person^{-1} day^{-1}		
1995						
1996						
1997						
1998						18-27" TL slot limit; 1 fish person^{-1} day^{-1} recreational; 250,000 lb commecial cap & 100 lb day^{-1} trip limit
1999	18" TL MLL; 1 fish >27" TL person^{-1} day^{-1}	18-27" TL slot limit; 5 fish person^{-1} day^{-1} with 1 fish allowed >27" TL person^{-1} day^{-1}	18" TL MLL; 5 fish person^{-1} day^{-1} with 1 fish allowed >27" TL person^{-1} day^{-1}	18-27" TL slot limit; 5 fish person^{-1} day^{-1} with 1 fish allowed >27" TL person^{-1} day^{-1}	18-27" TL slot limit; 5 fish person^{-1} day^{-1} with 1 fish allowed >27" TL person^{-1} day^{-1}	
2000						18-27" TL slot limit; 1 fish person^{-1} day^{-1} recreational; 250,000 lb commecial cap & 5 fish commercial trip limit
2001						
2002	18-27" TL slot limit; 1 fish >27" TL person^{-1} day^{-1}	20-27" TL slot limit; 5 fish person^{-1} day^{-1}	18-27" TL recreational slot limit & 1 fish person^{-1} day^{-1} recreational limit; 18-25" TL commercial slot limit & 5 fish person^{-1} day^{-1} commercial limit	18-25" TL slot limit; 5 fish person^{-1} day^{-1}	18-26" TL slot limit; 3 fish person^{-1} day^{-1}	18-27" TL slot limit; 1 fish person^{-1} day^{-1} recreational; 250,000 lb commecial cap & 0-10 fish commercial trip limit (set by commission proclomation) with red drum not exceeding 50% total marketable catch (excluding menhaden)
2003						
2004						
2005						
2006						
2007						
2008						
2009						
2010						
2011						
2012						
2013						
2014					18-26" TL recreational slot limit & 3 fish person^{-1} day^{-1} recreational limit; 18-25" TL commercial slot limit & 5 fish person^{-1} day^{-1} commercial limit	
2015						
2016						
2017						
2018						
2019						

Table 2. Red drum regulation timeline by jurisdiction for the southern stock.

Year	South Carolina	Georgia	Florida
Pre-1925	No Regulations	No Regulations	No commercial use by out of state citizens
1925			12" FL MLL
1953			15" FL MLL
1955			12" FL MLL
1960			
1971			12" TL MLL
1973			12" FL MLL
1976			
1978			
1985			18" TL MLL; 1 fish >32" TL; protected species[a]
1986	14" TL MLL from June 1-Sept. 1; 1 fish >32" person^{-1} day^{-1}	14" TL MLL; 2 fish >32" TL person^{-1} day^{-1}	
1987	14" TL MLL from June 1-Sept. 1; 1 fish >32" person-^{1} day^{-1}; commercial harvest prohibited		18" TL MLL; 1 fish >32" TL; March-April closure[b]
1988	14" TL MLL from June 1-Oct. 1; 20 fish person^{-1} day^{-1} & 1 fish >32" person^{-1} day^{-1}; commercial harvest prohibited		Moratorium
1989		14" TL MLL; 2 fish >32" TL person^{-1} day^{-1}; 10 fish person^{-1} day^{-1}	18-27" TL slot limit; March-May closed season; 1 fish person^{-1} day^{-1}; prohibition on sale[c]
1990	14" TL MLL; 20 fish person^{-1} day^{-1} & 1 fish >32" person^{-1} day^{-1}; commercial harvest prohibited		
1991	14" TL MLL; 5 fish person^{-1} day^{-1} & 1 fish >32" person^{-1} day^{-1}; commercial harvest prohibited	14" TL MLL; 5 fish person^{-1} day^{-1}	
1992			
1993	14-27" TL slot limit; 5 fish person^{-1} day^{-1}; commercial harvest prohibited	14-27" TL slot limit; 5 fish person^{-1} day^{-1}	
1994			
1995			
1996			18-27" TL slot limit; 1 fish person^{-1} day^{-1}; prohibition on sale
1997			
1998			
1999			
2000			
2001	15-24" TL slot limit; 2 fish person^{-1} day^{-1}; commercial harvest prohibited	14-23" TL slot limit; 5 fish person^{-1} day^{-1}	
2002			
2003			
2004			
2005			
2006			
2007	15-23" TL slot limit; 3 fish person^{-1} day^{-1}; commercial harvest prohibited		18-27" TL slot limit; 2 fish person^{-1} day^{-1} in NE (Atlantic) and NW (Gulf) regions; 1 fish person^{-1} day^{-1} for south region; prohibition on sale
2008			
2009			
2010			
2011			
2012			
2013			
2014			
2015			
2016			
2017			
2018	15-23" TL slot limit; 2 fish person^{-1} day^{-1} & 6 fish boat^{-1} day^{-1}; commercial harvest prohibited	14-23" TL slot limit; 5 fish person^{-1} day^{-1}; commercial sale prohibited	
2019			

a - harvest moratorium from 11/7/86-2/17/1987

b - harvest moratorium from 5/1-10/1/1987; reopened 10/1/1987 with 18-27" TL slot limit, 5 fish commercial possession limit & 1 fish recreational possession limit

c - prohibited gigging and spearing on 6/3/1991 (still in effect)

Table 3. Summary of red drum growth data by stock. Total length (TL) measurements are in centimeters.

Age	Northern					Southern				
	Mean TL	Min TL	Max TL	n	CV	Mean TL	Min TL	Max TL	n	CV
0	3.8	0.9	12.5	18,690	0.38	2.5	0.5	19.2	1,243	0.96
1	37.6	3.8	59.3	5,595	0.17	32.9	2.5	70.0	35,054	0.21
2	51.3	23.2	75.8	7,166	0.17	45.9	25.8	83.0	34,190	0.16
3	65.9	46.0	88.6	1,720	0.10	61.4	29.9	87.4	16,566	0.13
4	79.3	58.5	94.3	276	0.09	70.8	36.5	110.2	9,429	0.10
5	90.5	78.0	100.3	111	0.05	76.0	37.9	101.1	3,170	0.09
6	94.8	83.7	105.9	62	0.05	80.8	61.2	105.5	380	0.09
7	96.3	88.0	106.7	56	0.04	87.0	75.2	105.5	82	0.07
8	100.1	87.1	116.2	61	0.05	91.2	71.8	103.0	54	0.06
9	100.9	89.0	113.0	52	0.05	91.2	80.1	110.0	53	0.06
10	103.8	95.0	115.3	76	0.04	92.7	82.0	104.9	60	0.05
11	105.1	96.0	116.4	55	0.04	94.8	86.1	102.0	50	0.04
12	105.0	93.4	119.3	79	0.05	95.0	86.2	107.2	60	0.05
13	104.6	92.0	112.2	40	0.04	97.4	89.6	114.6	54	0.04
14	106.6	98.5	118.0	57	0.04	97.0	89.7	107.9	53	0.04
15	107.6	98.1	127.5	90	0.05	96.7	88.0	108.0	78	0.04
16	108.9	97.0	124.7	72	0.05	98.8	89.6	107.0	66	0.04
17	108.4	98.0	118.4	111	0.04	98.6	90.4	108.0	64	0.04
18	110.5	101.3	119.3	84	0.04	98.9	91.3	108.3	59	0.04
19	109.8	99.0	123.3	76	0.04	100.3	93.7	112.5	55	0.04
20	111.3	100.0	130.2	83	0.05	100.1	93.6	110.3	52	0.04
21	112.8	99.6	127.5	61	0.05	100.3	93.2	107.5	53	0.03
22	112.9	103.2	125.0	62	0.04	101.3	94.7	111.8	52	0.03
23	113.9	104.5	124.8	40	0.04	100.8	90.4	113.3	44	0.04
24	114.6	105.0	125.0	43	0.04	103.0	95.5	113.0	42	0.04
25	114.1	101.7	127.5	29	0.06	102.8	97.1	113.4	39	0.04
26	116.0	104.7	125.8	34	0.05	102.6	89.4	117.6	37	0.05
27	116.2	104.3	132.7	35	0.04	103.2	89.1	116.1	26	0.06
28	113.0	99.5	125.0	16	0.06	104.7	95.1	118.3	38	0.05
29	115.3	105.4	124.7	35	0.04	105.4	96.6	117.3	27	0.04
30	116.6	108.0	123.9	20	0.04	105.8	95.0	115.1	26	0.04
31	118.5	106.0	131.6	24	0.05	105.5	97.2	116.4	16	0.05
32	117.8	108.1	128.0	23	0.05	107.8	100.1	112.5	8	0.04
33	116.2	109.7	125.7	12	0.04	105.4	99.2	110.6	7	0.04
34	116.6	105.0	129.0	30	0.04	106.9	102.8	113.4	13	0.03
35	118.1	108.8	130.3	24	0.05	108.8	103.7	114.5	5	0.04
36	116.3	107.2	127.4	19	0.05	108.6	104.7	112.4	2	0.05
37	116.8	105.4	125.6	16	0.05	106.8	105.5	108.0	2	0.02
38	119.7	112.1	133.1	18	0.06	106.6	102.8	109.1	5	0.03
39	116.8	109.0	126.1	19	0.04	105.3	103.0	107.6	3	0.02
40	119.5	112.5	132.2	16	0.04	107.0	107.0	107.0	1	NA
41	118.7	104.5	144.1	12	0.08	107.8	107.5	108.0	2	0.00
42	119.3	111.2	128.3	8	0.05					
43	120.4	115.0	127.5	6	0.04					
44	107.0	107.0	107.0	1	NA					
45	119.2	114.5	121.6	4	0.03					
46	130.4	119.4	141.3	2	0.12					
47	118.5	112.0	126.1	5	0.05					
48	119.3	118.4	120.0	3	0.01					
49	127.9	122.2	133.6	2	0.06					
50	118.6	114.0	126.0	4	0.04					
51	121.3	121.3	121.3	1	NA					
52	126.8	123.3	130.4	2	0.04					
53	123.4	116.2	127.5	3	0.05					
54	130.0	130.0	130.0	1	NA					
55	124.4	124.4	124.4	1	NA					
56	126.0	122.2	129.8	2	0.04					
57	122.2	122.2	122.2	1	NA					
62	122.0	122.0	122.0	1	NA					

Table 4. Parameters for red drum age-specific K growth curves.

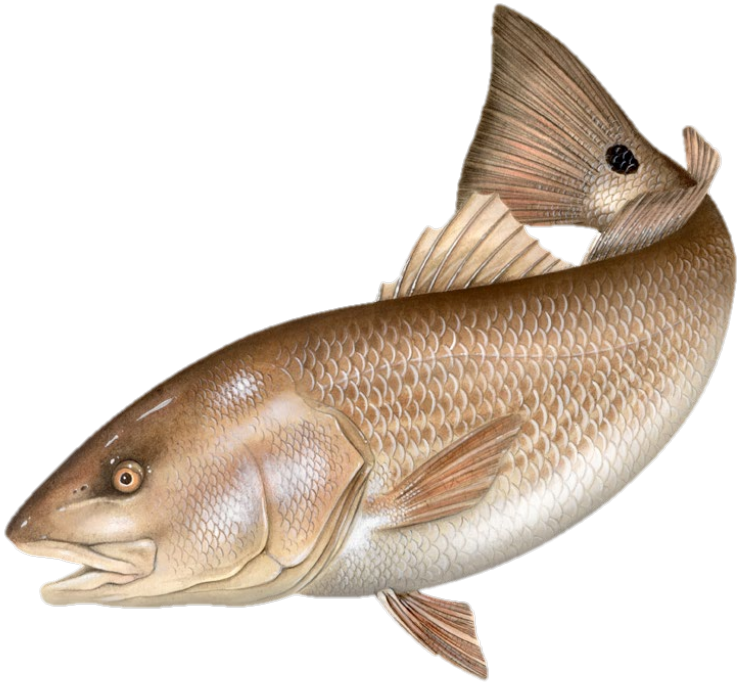
Parameter	Stock	
	Northern	Southern
Amin (age for first size-at-age, Lmin)	1.083	1.167
Lmin (cm)	10	6
Linf (cm)	125	107
von Bertalanffy Base K (youngest ages)	0.35	0.52
K age break points	2, 4, 6, 12, 18	2, 7, 12, 18
Age break point K multipliers	0.75, 0.91, 0.3, 0.6, 1.3	0.47, 0.38, 0.75, 1.6
Length-at-age CV for smallest sizes	0.23	0.18
Length-at-age CV for largest sizes	0.04	0.06

Table 5. Relationships between length at maturity and age at maturity in red drum from North Carolina and South Carolina. Parameters a and b (± SE) are for the logistic function Proportion Mature=e^Z/(1+e^Z) where Z=a+b*Predictor.

Region	Sex	n	Predictor (independent variable)	*a* (const)	±se	*b* (slope)	±se	50% maturity	Data used
NC	Female	305	Length (TL, mm)	-38.8400	7.37006	0.0445117	0.0085605	872.6	Jul-Dec
NC	Female	334	Age (decimal years, Jan 1 birth date)	-29.8740	6.05016	7.2755200	1.5720700	4.1	Feb-Dec
NC	Male	340	Length (TL, mm)	-19.8010	3.76561	0.0294404	0.0054736	672.6	Jul-Dec
NC	Male	318	Age (decimal years, Jan 1 birth date)	-10.8147	1.88893	3.6662400	0.6152680	2.9	Feb-Dec
SC	Female	1,805	Length (TL, mm)	-17.8929	1.13022	0.0228056	0.0014545	784.6	Jul-Dec
SC	Female	2,613	Age (decimal years, Jan 1 birth date)	-9.0749	0.45404	1.7918600	0.1073900	5.1	Jan-Dec
SC	Male	2,927	Length (TL, mm)	-18.3791	1.14192	0.0264934	0.0016986	693.7	Jul-Dec
SC	Male	2,930	Age (decimal years, Jan 1 birth date)	-10.1218	0.45237	2.4274500	0.1250110	4.2	Jan-Dec

Atlantic States Marine Fisheries Commission

2022 Red Drum Simulation Assessment
Peer Review Report



Conducted on
March 28-30, 2022

Prepared by the
ASMFC Red Drum Simulation Assessment Review Panel

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INTRODUCTION

Red Drum *Sciaenops ocellatus* is a popular recreational fish along the Atlantic and Gulf coasts of the United States. Red drum exhibit ontogenous movement dynamics whereby young of year and sub-adults spend their time in estuarine environments and adults migrate further offshore. Recreationally caught fish can be harvested if fish are within a slot length limit. Data collected from the adult population is sparse and mainly consists of information from various long line surveys. The lack of available adult abundance information results in stock assessments that have been unable to accurately estimate stock status. The purpose of this review is to evaluate and identify stock assessment methods most robust to the types of data available for red drum. This was accomplished by simulating data using an operating model and then fitting simulated data using various stock assessment models. The three models considered and compared in the simulation assessment include the Traffic Light Approach (TLA), SCA (a statistical catch-at-age model developed in ADMB and used historically for red drum), and Stock Synthesis (SS; a statistical catch-at-age model developed in the SS program).

The Review Panel (RP) recommends the use of the SS program to assess both the northern and southern stocks of red drum, with the use of the TLA as an accessory tool between assessments. The SCA model was not able to reproduce the outcomes from the operating model when fitting to near-perfect data. The SS model is ready to use for the northern stock, while the model for the southern stock requires more exploration before use in stock assessment. In particular, some results were unexpected and unexplained. The unexpected results are detailed below and require further attention.

The Review Panel (RP) appreciates all of the hard work by the Red Drum Stock Assessment Subcommittee (SAS) and Technical Committee to create a comprehensive simulation assessment. The Panel also thanks the Director of Fisheries Science for organizing the meeting, providing materials to the Review Panel in a timely fashion, and additional support throughout the review. A Review Workshop was conducted in Raleigh, North Carolina, during the week of March 28, 2022. Workshop discussions were professional and constructive, and overall the simulation assessment passes review.

The following report provides an evaluation of the simulation work and recommendations from the Panel, with detailed comments for each Term of Reference.

TERMS OF REFERENCE

1. Evaluate the thoroughness of data collection, data treatment, data presentation, and characterization of data uncertainty.

The Review Panel believes the Stock Assessment Subcommitee did an excellent job of summarizing and analyzing a large number of complex data sets that went into the assessment models. The simulation assessment is thorough in its description of the data sources and how they are used in the three different models. Uncertainty is well characterized overall, although we note a few cases where the models are biased via not making accurate predictions when given perfect data (e.g., SS model for southern stock). We suggest attempting a few adjustments to remove bias and improve the utility of the models.

We believe the authors should consider alternate growth curve formulations. Schueller et al. (2014) offers a potential for bias correction to consider. Alternately, Lester et al. (2004) offers a growth model that specifically models the pre-maturation phase of growth separately from the mature phase that could produce a better fit to the data. The RP believes the two approaches should be considered to better model size at age. However, the RP notes several aspects of the size at age data that could result in biased growth parameters, regardless of the model chosen.

a. Variability in size at age declines with age, an unlikely relationship that may be a result of gear bias; in most fishes, variability in size at age is constant or increases with age
b. Drum in the 70-90 cm size range are not well sampled, likely a result of gear bias; and
c. The RP also believes future explorations of size at age for red drum stocks should evaluate existing growth increment data from the tagging studies, to further elucidate growth patterns.

Thus, the data available to analyze growth for red drum are likely problematic and need further consideration and analysis. Traditionally, the expectation is that as age increases, the variability in size is likely to remain constant or increase. The lack of such a trend in the data suggests there is a bias in data collection and the full variability of size at age is not being sampled. One potential bias could be a gear bias where a certain survey or fishery gear doesn't sample specific sizes well. Another example could be a bias due to spatial dynamics of the population and no sampling occurring within a given area or time frame. This potential bias in sampling leads to a potential bias in the estimation of the growth curve parameters. When estimating growth, one assumption is the data at age are representative of the range of sizes at that age.

The Assessment Committee made the assumption that the data reflect the true size distribution at age and corrected the growth curve estimation by allowing for an age-varying K parameter for the von Bertalanffy growth curve. An alternative explanation is the data are not representative of the full distribution of sizes at a given age. If this is the case, the estimation of the von Bertalanffy growth curve should be bias corrected such that all of the parameters would be estimated in an unbiased manner. A tested method to bias correct

growth curve estimations can be found in Schueller et al. (2014). The RP recommends bias correcting the growth data given the lack of samples in the 70-90 cm range, which indicates the full size range at age is unlikely to be sampled across all age classes. In addition to the bias correction, the data should be explored over time to assess the possibility of time-varying growth. However, the RP recognizes that considering and correcting for bias in the growth data could be beyond the scope of the simulation assessment. The RP suggests further exploration of how bias in growth parameters could influence the simulation assessment model results.

The RP also notes that potential growth information from tagging data has not been investigated in past stock assessments due to availability of traditional age-length data. Various tagging programs for red drum have been conducted in multiple states. There is a substantial amount of tagging data available, including information on large and old individuals. The RP recommends analyzing the size increment data from tagging programs. For example, analysts can fit the growth increment form of the von Bertalanffy function (Fabens 1965) to the size increment data. The estimated von Bertalanffy parameters (K and Linf) can then be compared with those obtained from the age-length data. The comparison may shed light on the representativeness of the age-length data. Furthermore, it may be worthwhile to fit the von Bertalanffy growth curve using both size increment and age-length data (Kirkwood 1983). Again, this is a recommendation for future assessments.

The survey index data for the northern model were appropriate and were limited to one index for recruitment, one index for sub-adults, and one index for mature adult abundance. The approach used in the northern region uses the available data to the extent scientifically possible.

The survey index data for the southern model were more plentiful and complex. The base configuration of the southern model included eight index data sets. The model included three indices of recruitment, two indices for sub-adults, and three indices representing mature abundance. When multiple indices are included that represent the same segment of the population, the estimation model will find similar trends, but will also have a difficult time fitting the data if the same underlying trends are not informing the data. Moving forward with the estimation model, analysts should consider providing the best information available on trends in abundance over time for the given size and age ranges. With multiple possible data sources, analysts should consider prioritizing the data and using the longest time series and largest, most representative spatial scales. If that is not an option and all data are equally valuable, analysts could consider combining indices using a variety of different options such as the Conn method (Conn 2010), VAST (Thorson 2019), hierarchical modeling, or dynamic factor analysis. In addition, exploring the relationship of the indices to each other through correlation analyses, with appropriate lags to account for size or age class differences, is critical to determining if the estimation model inputs provide a cohesive picture of the stock dynamics.

Natural mortality is one of the most critical parameters influencing the identification of sustainable harvest levels. The RP feels the simulation assessment handled natural mortality

appropriately using surrogate measures for M and size dependency in M. Overall, the natural mortality approach used in the models was appropriate.

During discussions, the RP learned that much more tagging data exists that could provide better informed estimates of fishing mortality, particularly in North Carolina and South Carolina. There are evidently data that correct for non-reporting of tags and thus could be very useful. The RP encourages new analyses of the tagging data to obtain estimates of harvest rate information (F) that could improve future assessments.

Finally, the discard mortality rate was a key uncertainty in this assessment, as well as the number and size composition of released fish that ultimately would be exposed to discard mortality (currently set at 0.08). There is a key need to better quantify the number and sizes of discarded catch, particularly given the apparent recent increase in anglers targeting large, spawning fish offshore. The RP recommends better data collection of discard numbers and sizes as a high priority for future assessments, including the use of angler phone apps and other tools to measure the size and number of discarded fish. Further, the assessment could benefit from more sensitivity analyses to evaluate how the size and number of discarded fish could influence the assessment trends and reference points. Finally, the RP believes the discard mortality rate of 0.08 could be a bit high, and should consider the effects of lower values (e.g., 0.04). That said, the number and size of discarded fish is a major uncertainty that if quantified, would improve future assessments.

2. Evaluate the thoroughness and appropriateness of information used to parameterize simulation models.

The RP feels the SAS did a very thorough job of parameterizing the models, including critical parameters of natural mortality and recruitment compensation. There is some uncertainty in how selectivity from the different regions is influencing model outputs, as regulations changed through time and were different across the states. This creates uncertainty in the models because the north and south stocks have different selectivities, likely operating within different states for each region (north and south). Selectivity is particularly concerning for the southern stock where size and bag limits varied through time and across the states of South Carolina, Georgia, and Florida. An amalgamation of selectivities could contribute to uncertainty and possibly bias in the southern stock SS model. The RP recommends further sensitivity analyses to explore how changes in the selectivity curves influence model predictions when given perfect data.

3. Evaluate the appropriateness of models for simulating red drum populations and generating data sets sampled from the simulated populations.

The Stock Synthesis simulation package (SSsim) is used to simulate red drum populations and create data sets from the operating models. The RP agrees this is an appropropriate model or method for simulating red drum populations and generating data sets for use in the estimation

models. Overall, the uncertainty in the operating model represents the observed uncertainty in the data.

4. Evaluate the incorporation and treatment of uncertainty in simulated populations.

The RP feels that uncertainty was handled appropriately overall. The SAS includes uncertainty through variable population dynamics scenarios in the operating model (OM). These include a scenario in which fishing pressure is increased in the projection period, an increase in the selectivity at age of older fish through a catch and release trophy fishery, a scenario in which natural mortality is lower than expected, and a time varying realized recruitment scenario. The incorporation of uncertainty into the simulated populations in the operating model is well described and appropriate for red drum.

5. Evaluate candidate assessment methods and application of assessment methods to data sets sampled from simulated populations.

The Stock Assessment Subcommittee (SAS) explored a few assessment methods within each of the estimation models (EM). Exploration of assessment methods is constrained by the limitations of each EM framework and by the requirement that any model configuration has to be flexible enough to fit the data provided by each of the scenarios developed in the OM.

In general, the assessment methods available for exploration in the SCA are limited compared to those available in the SS EM. For example, the SAS explored estimating time varying equilibrium recruitment (R0) in SS as an attempt to fit the data produced by the OM, which has a temporally varying stock recruitment relationship. The SCA EM does not estimate stock recruitment parameters and so no such exploration is possible.

The assessment methods available in SS are many and varied. The SAS chose to limit the tuning of SS models to configurations that would fit all of the runs from each of the OM scenarios. The approach means that some individual runs and scenarios could be fit better, and results for the SS models are possibly less precise than they could be. However, the RP recognizes it would be unreasonable to attempt to tailor each fit to the hundreds of OM runs. SS employs parameter penalties to help with estimation. The penalties can be (mis)used to direct the EM to a particular solution on the likelihood surface, inflating the perceived stability of the model. The SAS does not misuse this feature of SS. They employ appropriate penalties on parameters that are weak enough to allow a broad array of solutions and provide enough guidance to help with model convergence. Other choices made in configuring SS for each OM scenario are reasonable and would likely have been employed by other competent stock assessment scientists given similar datasets.

The RP finds the application of assessment methods to be appropriate and representative of the choices made by professional stock assessment scientists. However, a few additional items could be considered.

First, further examination of the SS estimated stock-recruit relationship, including the steepness parameter, is recommended. The estimated steepness values are unexpectedly low for both north and south stocks, causing an estimated SSB ratio with considerably high bias (e.g., scenario ***Depr R***). The RP feels the assessments do not appear to have data to inform steepness, and thus recommend fixing steepness at 0.99. However, the RP recognizes that such model configuration, in conjunction with other fixed life history parameters (e.g., natural mortality), could constrain the calculation of potential reference points. Fixing several parameters limits the flexibility for reference points to be informed by the data.

Second, the RP recommends exploration of the start year of the model. Given the time series available, the model could be started earlier than 1989 or later than 1989. The model could be started earlier, for example 1950, in order to capture the decline in the population with increased catches by both the commercial and recreational fisheries, and to leverage all of the available data. In addition, a later start year of 1991 could be considered if tagging data were to be used. Parameter estimates from the tagging data during the earliest years were quite uncertain. Censoring those earlier years may help with parameter estimation and model performance. Additional sensitivity runs should be used to diagnose the robustness of the model outcomes to the decision of the starting year of the model. In some cases, the choice of start year can lead to difficulties initializing the model at the appropriate scale of abundance given the data available and the level of depletion.

6. Evaluate the choice of reference points for characterizing stock status of simulated populations. Recommend alternatives if necessary.

In general, the RP feels the reference points selected by the SAS are appropriate. The RP agrees that an escapement reference point is vital to assessing a stock primarily driven by recruitment. The RP recommends monitoring both an annual and 3-year moving average measure of SPR status. The three year moving average introduces some inertia into the management process and reduces the probability that management actions are based on noise rather than signal. The annual measure can be important to balance that inertia with the ability to detect rapid changes in SPR status that might require immediate attention.

SSB status could turn into a trend-based reference point, but the SAS would need to select a reference time period. A general result of the simulation exercise is that trend was more stable than scale in SS models for both regions. If this result holds, once a final version of the SS model for the south is configured, there is a possibility of using an SSB reference point based on trend for management. Trend-based SSB reference points require a reference period for internal comparison. Identifying an appropriate reference period would require further study by experts in the fishery and is outside the purview of the RP.

The SS model for the south appears biased in scale, but demonstrates a stable trend. This result indicates trend based reference points could be useful for management. The RP thinks trend based reference points are a potentially useful tool to mitigate a model that shows scale instability. However, the Panel recognizes there may also be trends in bias. Once the SAS has

demonstrated that the EM for the south can reproduce the dynamics of the OM when given data without observation error, it will be possible to determine if there are trends in bias and by extension whether or not trend-based reference points are appropriate.

7. Evaluate the choice of metrics used to evaluate performance of each candidate assessment method for estimating the population dynamics and stock status of simulated populations. Recommend alternatives if necessary.

The selected performance metrics are appropriate and represent standard reference points for diagnosing overfishing in stock assessments. The escapement goals for red drum are sound performance metrics for a stock with dome-shaped selectivity that focuses harvest on juvenile fish.

The SAS conducted 100 iterations for each scenario and computed relative error and error rates (Type I and Type II) as metrics for each EM and scenario. Given that process error (recruitment deviations) is also introduced to the simulation, the RP feels that 100 iterations is a low number and simulation results might reflect a substantial amount of randomness. The RP notes the actual number of iterations is lower because non-converged runs were excluded. The RP recommends the following two exercises to explore the impacts of number of iterations: (1) for a given scenario, increase the number of iterations to 200 and compare the results with 100-iteration results; (2) for a given scenario, perform several runs of 100 iterations and check variability in produced relative errors and error rates among runs. For the purpose of model comparison, however, the RP thinks 100-iteration results will likely indicate the difference in performance among EMs. For a given scenario the SAS fit all of the EMs to the same <100 datasets. The EMs used the same datasets and comparisons were based upon medians.

8. Evaluate the choice of the preferred assessment method(s) for characterizing stock status. Recommend alternatives if necessary.

The RP evaluated all three assessment methods presented by the SAS: TLA, SCA, and SS. Overall, the RP does not recommend further exploration of the SCA model. The RP recommends the use of the SS model for future analyses and assessments, and recommends use of the TLA as an accessory model.

The RP recommends that the SCA model should not be further explored for red drum stocks because the SCA seems to be intrinsically biased even when using perfect data from the operating model. The RP notes the initialization of the SCA and the bias associated with it could be remedied with alternative approaches to initialization (Figure 1). Additionally, the RP notes the SS model is essentially an SCA approach with more flexibility. While the RP agrees that, with more work, the SCA model is likely to be able to produce robust, unbiased estimates, the time and resource commitment is not worthwhile. Ultimately, the RP recommends not pursuing the SCA model further for the red drum stocks.

The RP expects the SS model to produce unbiased and robust estimates of the red drum stocks given that the Operating Model producing data was SSsim. The SS model for the northern region appeared to be unbiased when using perfect data from the operating model (Figure 2). The SS model for the southern region needs additional work to determine if the model can produce unbiased estimates while using perfect data from the operating model. The conclusions from the report for the SS south model are potentially uninformative because of the lack of a working model using the perfect data from the OM. The expectation is that the SS model will be able to reproduce the OM with further work. At that time, the sensitivity runs may need to be redone to reassess conclusions. Options to explore as the SAS determines what is leading to the inability to reproduce OM results include: 1) more years of model sensitivity runs, 2) consider impacts of growth curve biases on the results, and 3) explore the effects of different selectivity curves through time used for South Carolina, Georgia, and Florida. It would be worth exploring how the selectivity parameters influence model results, particularly given the changes in selectivity through time and across states in the southern region. In the absence of other ideas for improving the fit to data without error, it would be worth fixing all but one of the scaling parameters at their true values to make sure there are no gross specification errors present in the EM model configuration. If the one estimated scaling parameter (for example R0) is accurately reproduced in the EM, the remaining parameters could be iteratively opened to estimation in order to track down which ones are introducing bias into the model. Additional penalties (parameter priors) on troublesome parameters may be warranted.

The RP is particularly concerned with the unexpected outcomes in the "sensitivity runs" that remain unexplained for both the north and the south SS models. For the northern model, incorporation of the B2 (recreational live discards) composition data improves characterization of discards but results in more biased results, rather than less biased results. For the southern model, the use of the true growth information or model from the operating model does not improve the robustness of estimates.

Finally, the TLA may be a useful accessory tool because it shows no bias and provides recruitment information. TLA could be used as an annual, interim tool between assessments, as recommended by the SAS. TLA provides information on Recruitment Condition and SSB status and could be used as a tool to indicate the need for an assessment during periods of poor recruitment. The RP expresses concern over the methods for determining the reference points used in the evaluation of TLA performance. The grid search method uses information from the entire time series of the simulation, including the projection years. Therefore the TLA leverages information not available to the other models and would not be available to a TLA based on 'in situ' data. It would be informative to repeat the grid search using only the 'burn in' and pre-2023 periods to see if the reference points identified were similar to the ones identified in the presented assessment. The reduced time series grid search would be more directly comparable to the other assessment models and would be representative of options available in an 'in situ' application of the TLA.

During the Review Workshop, the RP made analytical requests to the SAS that were informative for determining the status of each of the models for use in red drum assessment and

management. During Day 1, the RP requested running each of the estimation models with perfect or near perfect data from the operating model. This would allow the RP to assess how well the estimation model performs given a perfect dataset. The RP requested running data from the operating model with no error in the SS and SCA estimation models using only one iteration each for the north and south. The request included using all data from all years but with no observational error. The SAS provided the results, leading to the conclusions above regarding use of the SCA and SS models.

On Day 2 of the Review Workshop, the RP made additional analytical requests. The first was to continue to run the perfect data from the OM in the estimation model configurations for the southern region. In addition, the RP made requests intended to sleuth out why the southern region was not performing as expected or why the SCA model was not matching the operating model data well. First, the RP requested fixing the initial numbers at age at the true values for the northern SCA model in order to help with model initialization (Figure 1). Second, the RP requested fixing M at the true value whereby the value for the Age 7+ group was averaged across all of the available ages. The preferred average was the numbers-weighted M for the Age 7+ group for the south and north using the base model.

On Day 2, the RP also requested additional figures for consideration. First, the RP wanted to see the annual SPR values instead of the three year average SPR values. Second, the RP wanted to double check what SS was doing with the SPR calculations and requested the values be computed using a manual SPR calculation in a spreadsheet. Finally, the RP requested that growth and B2 be calculated annually. These requests were made in order to guide future work on the models in preparation for future red drum stock assessments.

Finally, the RP recognizes the spatial structure of the models needs further exploration and future assessments may or may not have the same structure explored here. Given the analyses explored for the simulation assessment, it was difficult to properly evaluate the most robust choices for spatial delineation and spatial assumptions within the modeling framework. Future exploration of the decisions regarding spatial assumptions should include analyses of the tagging data and the consideration of one model versus separate northern and southern models. Several capabilities within Stock Synthesis could be explored. One example could be one model with limited movement, but two separate areas for estimation of life history parameters and fishing mortality rates, plus the incorporation of tagging data. The single model could be set up to leverage all of the data available for the species while still allowing for differential management and population dynamics of red drum in the north versus the south. Another example could be two separate models, as presented here, one each for the north and the south, with tagging data incorporated.

9. **Review recommendations on future monitoring provided by the Technical Committee and comment on the appropriateness and prioritization of each recommendation. Provide any additional recommendations warranted.**

This TOR is partially addressed. The RP could not fully evaluate the simulation results for the southern area due to lack of a converged model that could accurately reproduce the OM when given data without observation error. Results from the future monitoring prioritization study are counter-intuitive and therefore could not be fairly interpreted. The RP feels the longline survey is very likely to be important to the assessment because it is the only source of information for adult fish. However, the simulation study indicates the long line data are not helpful to the assessment. Removing long line data made little or no difference to the results. Also, the RP feels additional length composition data from recreational discards should help the model inform recreational discard selectivity, and improve model performance. Counter to expectations, simulation results show increased bias relative to the OM when recreational discard composition data are added to the northern model. The RP feels it is important to understand why these results occurred before recommending a prioritization of future monitoring efforts.

One additional option to explore is the creation or collection of data to inform trends and selectivity of fish in the 70-90 cm range. The sampling gears and methods used to collect data for red drum generally do not catch large numbers of fish in the 70-90 cm range. The RP is concerned the range of ages in that size class is not well characterized. Collection of data from the 70-90 cm size range (28-35 inches) will likely provide information on age, trends in abundance, and selectivity across gears. This information will in turn lead to better, more robust analyses of growth.

10. Prepare a peer review panel report summarizing the panel's evaluation of the simulation assessment and addressing each peer review term of reference. Develop a list of tasks to be completed following the workshop. Complete and submit the report within 4 weeks of workshop conclusion.

This peer review panel report fulfills the requirements under this term of reference. The RP has provided detailed information for each review panel term of reference. The report was completed in the allocated time frame.

Following the Review Workshop, the Assessment Committee needs to work on fitting the SS southern model to the "perfect" data from the operating model, in order to show the estimation model can reproduce the truth from the operating model. Once that work is done, the Committee can move forward in considering our recommendations for the assessment of red drum in the northern and southern regions.

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FIGURES

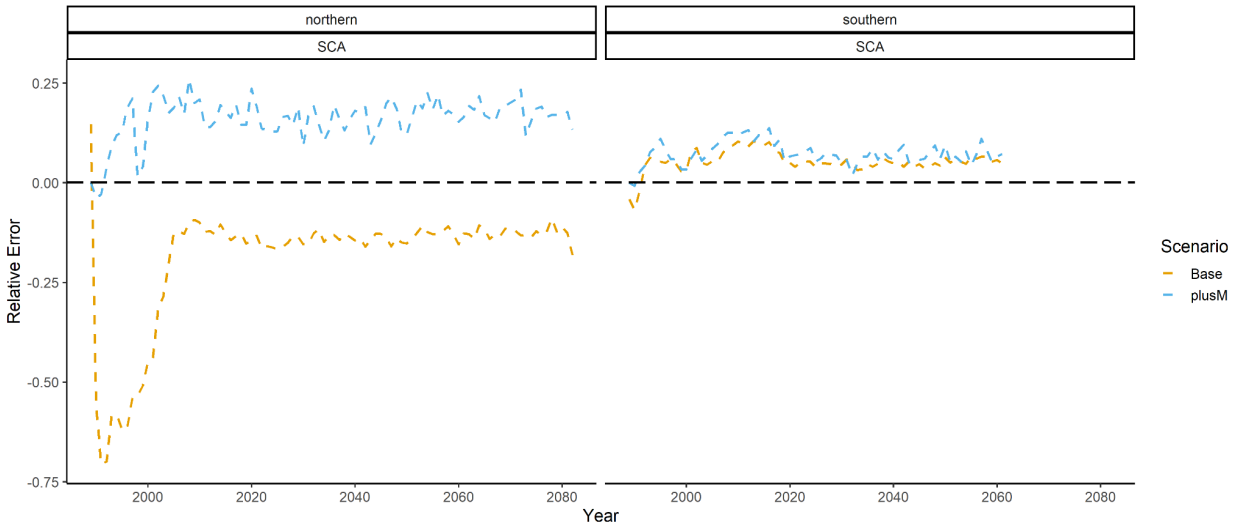

Figure 1. A plot of the relative error in sub-adult abundance for the northern and southern SCA models demonstrating that fixing parameters can lead to reduced bias in the early part of the time period for the north. This likely indicates something amiss with the initialization.

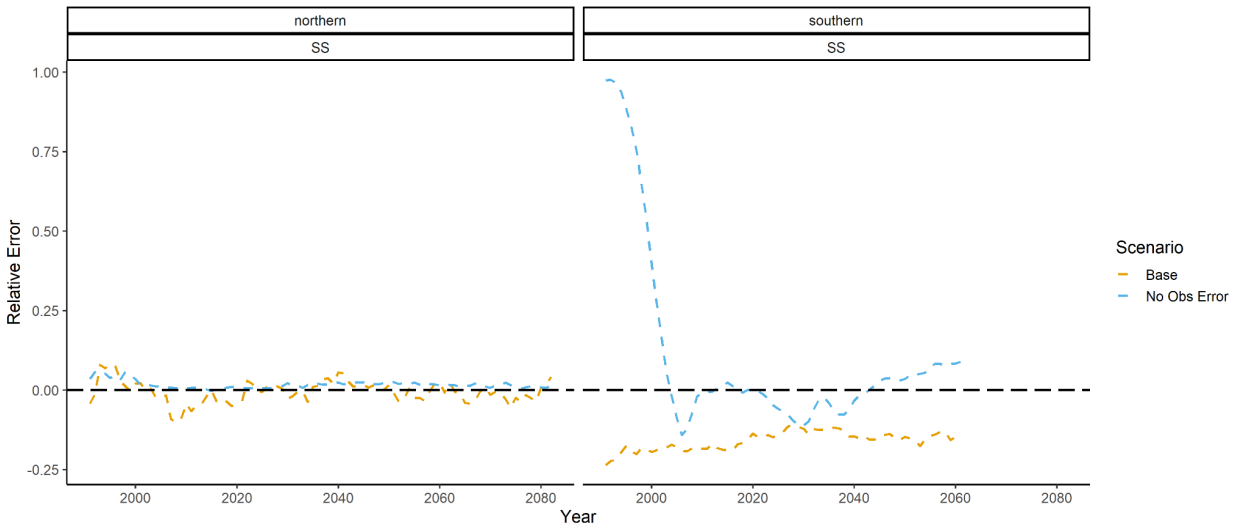

Figure 2. A plot of the relative error in the three year F ratios for the northern and southern SS models demonstrating that the northern model was able to produce unbiased results when using the perfect data from the operating model.

Atlantic States Marine Fisheries Commission

Horseshoe Crab Management Board

May 3, 2022
8:30 - 10:00 a.m.
Hybrid Meeting

Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary.

1. Welcome/Call to Order *(J. Clark)* 8:30 a.m.

2. Board Consent 8:30 a.m.
   - Approval of Agenda
   - Approval of Proceedings from January 2022

3. Public Comment 8:35 a.m.

4. Progress Update on Draft Addendum VIII *(C. Starks)*
   - Review Recommendations on Options for Implementing the Adaptive Resource Management (ARM) Framework Revision
   - Provide Guidance to the Plan Development Team

5. Update on PDT Review of Biomedical Mortality and Best Management Practices for Biomedical Collections (*C. Starks*) 9:40 a.m.

6. Other Business/Adjourn 10:00 a.m.

The meeting will be held at The Westin Crystal City (1800 Richmond Highway, Arlington, VA; 703.486.1111) and via webinar; click here for details

MEETING OVERVIEW

Horseshoe Crab Management Board Meeting
May 3, 2022
8:30 - 10:00 a.m.
Hybrid Meeting

Chair: John Clark (DE) Assumed Chairmanship: 1/22	Horseshoe Crab Technical Committee Chair: Natalie Ameral (RI)	
Vice Chair: VACANT	Horseshoe Crab Advisory Panel Chair: Brett Hoffmeister (MA)	Law Enforcement Committee Representative: Nick Couch (DE)
Delaware Bay Ecosystem Technical Committee Chair: Wendy Walsh (FWS)	Adaptive Resource Management Subcommittee Chair: Dr. John Sweka (FWS)	Previous Board Meeting: January 26, 2022
Voting Members: MA, RI, CT, NY, NJ, DE, MD, DC, PRFC, VA, NC, SC, GA, FL, NMFS, USFWS (16 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from January 26, 2022

3. Public Comment – At the beginning of the meeting public comment will be taken on items not on the agenda. Individuals that wish to speak at this time must sign-in at the beginning of the meeting. For agenda items that have already gone out for public hearing and/or have had a public comment period that has closed, the Board Chair may determine that additional public comment will not provide additional information. In this circumstance the Chair will not allow additional public comment on an issue. For agenda items that the public has not had a chance to provide input, the Board Chair may allow limited opportunity for comment. The Board Chair has the discretion to limit the number of speakers and/or the length of each comment.

4. Progress Update on Draft Addendum VIII (8:45-9:40 a.m.)

Background

- In October 2019, the Board directed the Adaptive Resource Management (ARM) Subcommittee to begin working on updates to the ARM Framework to revisit several aspects of the ARM model to incorporate horseshoe crab population estimates from the Catch Multiple Survey Analysis (CMSA) model used in the 2019 Benchmark Stock Assessment and the most current scientific information available for horseshoe crabs and red knots.
- In January 2022, the Board accepted the ARM Revision and Peer Review for management use, and initiated a Draft Addendum to consider allowing its use in setting annual specifications for horseshoe crabs of Delaware Bay-origin. The Horseshoe Crab PDT met on April 7, 2022 to develop recommendations and draft management options for Board consideration (**Briefing Materials**).

Presentations

- Plan Development Team Recommendations for Draft Addendum VIII by C. Starks

Board actions for consideration at this meeting

- Provide feedback to the PDT on Draft Addendum VIII management options

5. Update on PDT Review of Biomedical Mortality and Best Management Practices for Biomedical Collections (9:40-10:00 a.m.)

Background

- In October 2021, The Board tasked the Plan Development Team to review biomedical mortality, discuss biologically-based options for setting the threshold, and consider updates to best management practices for handling biomedical collections.
- The PDT requested advice from the Technical Committee (TC) on this issue. The TC met on April 14, 2022 to discuss the task and discuss potential strategies for setting a biologically-based threshold for biomedical collections, and review the 2011 best management practices (**Supplemental Materials**).

Presentations

- Update on Task to Review Biomedical Mortality and Best Management Practices for Biomedical Collections by C. Starks

6. Other Business/Adjourn

Horseshoe Crab

Activity level: Medium

Committee Overlap Score: Low (SAS overlaps with BERP)

Committee Task List

- PDT – Development of Draft Addendum VIII to consider use of the ARM Revision in setting Delaware Bay harvest specifications
- PDT – review the threshold for biomedical use to develop biological based options for the threshold and to develop options for action when the threshold is exceeded; review best management practices for handling biomedical catch and suggest options for updating and implementing best management practices (BMPs).
- TC – July 1st: Annual compliance reports due
- ARM & DBETC – Fall: Annual ARM model to set Delaware Bay specifications, review red knot and VT trawl survey results

TC Members: Natalie Ameral (RI, Chair), Jeff Brunson (SC), Derek Perry (MA), Deb Pacileo (CT), Catherine Ziegler (NY), Samantha Macquesten (NJ), Jordan Zimmerman (DE), Steve Doctor (MD), Ellen Cosby (PRFC), Adam Kenyon (VA), Jeffrey Dobbs (NC), Eddie Leonard (GA), Claire Crowley (FL), Chris Wright (NMFS), Joanna Burger (Rutgers), Mike Millard (USFWS), Kristen Anstead (ASMFC), Caitlin Starks (ASMFC)

Delaware Bay Ecosystem TC Members: Wendy Walsh (USFWS, Chair), Amanda Dey (NJ), Samantha Macquesten (NJ), Henrietta Bellman (DE, Vice Chair), Jordan Zimmerman (DE), Steve Doctor (MD), Adam Kenyon (VA), Jim Fraser (VA Tech), Eric Hallerman (VA Tech), Mike Millard (USFWS), Kristen Anstead (ASMFC), Caitlin Starks (ASMFC)

ARM Subcommittee Members: John Sweka (USFWS, Chair), Larry Niles (NJ), Linda Barry (NJ), Henrietta Bellman (DE), Jason Boucher (DE), Steve Doctor (MD), Wendy Walsh (USFWS), Conor McGowan (USGS/Auburn), David Smith (USGS), Jim Lyons (USGS, ARM Vice Chair), Jim Nichols (USGS), Kristen Anstead (ASMFC), Caitlin Starks (ASMFC)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

HORSESHOE CRAB MANAGEMENT BOARD

Webinar
January 26, 2022

TABLE OF CONTENTS

INDEX OF MOTIONS

ATTENDANCE
Board Members

Dan McKiernan, MA (AA)
Raymond Kane, MA (GA)
Sarah Ferrara, MA, proxy for Rep. Peake (LA)
Conor McManus, RI, proxy for J. McNamee (AA)
David Borden, RI (GA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
Matt Gates, CT, proxy for J. Davis (AA)
Rob LaFrance, CT, proxy for B. Hyatt (GA)
John Maniscalco, NY, proxy for J. Gilmore (AA)
Emerson Hasbrouck, NY (GA)
John McMurray, NY, proxy for Sen. Kaminsky (LA)
Joe Cimino, NJ (AA)
Peter Clarke, NJ, proxy for T. Fote (GA)
John Clark, DE (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Mike Luisi, MD, Administrative proxy
Russell Dize, MD (GA)
David Sikorski, MD, proxy for Del. Stein (LA)
Pat Geer, VA, Administrative proxy
Bryan Plumlee, VA, (AA)
Shanna Madsen, VA, proxy for Sen. Mason (LA)
Chris Batsavage, NC, proxy for K. Rawls (AA)
Jerry Mannen, NC (GA)
Bill Gorham, NC, proxy for Rep. Steinburg (LA)
Mel Bell, SC (AA)
Doug Haymans, GA (AA)
Spud Woodward, GA (GA)
Erika Burgess, FL, proxy for J. McCawley (AA)
Marty Gary, PRFC
Chris Wright, NMFS
Lowell Whitney, USFWS

(AA = Administrative Appointee; GA = Governor Appointee; LA = Legislative Appointee)

Ex-Officio Members

Jeff Brunson, Technical Committee Chair
Brett Hoffmeister, Advisory Panel Chair
John Sweka, ARM Subcommittee Chair

Staff

Robert Beal
Toni Kerns
Laura Leach
Lisa Carty
Maya Drzewicki
Tina Berger
Pat Campfield
Kristen Anstead
James Boyle
Emilie Franke
Lisa Havel
Chris Jacobs
Jeff Kipp
Justin Colson Leaning
Adam Lee
Kirby Rootes-Murdy
Sarah Murray
Caitlin Starks
Anna-Mai Svajdlenka
Deke Tompkins
Geoff White

Guests

Max Appelman, NOAA
Mike Armstrong, MA DMF
Pat Augustine, Coram, NY
Jason Avila, Avila Global
Megan Barrow, NYS DEC
Linda Barry, NJ DEP
Alan Bianchi, NC DENR
Nora Blair, CRL
Kurt Blanchard, RI DEM
John Born
Mark Botton, Fordham Univ
Jeff Brust, NJ DEP
Allen Burgenson, Lonza
Laura Chamberlin, Manomet
Margaret Conroy, DE DFW
Yong Chen, Stonybrook
Margaret Conroy, DE DFW
Heather Corbett, NJ DEP
Stephen Cottrell
Nick Couch, DE DFW
Nathan Cowen, FL
Deborah Cramer
Jessica Daher, NJ DEP
Jamie Darrow, NJ DEP

These minutes are draft and subject to approval by the Horseshoe Crab Management Board.
The Board will review the minutes during its next meeting.

Guests (continued)

Steve Doctor, MD DNR
Paul Eidman
Catherine Fede, NYS DEC
Lynn Fegley, MD DNR
Cynthia Ferrio, NOAA
Brad Floyd, SC DNR
Brendan Harrison, NJ DEP
Hannah Hart, FL FWC
Helen Takade-Heumacher, EDF
Jessie Hornstein, NYS DEC
Christian Hunt
James Jewkes
Carrie Kennedy, MD DMR
Adam Kenyon, VMRC
Marguerite Koehler, TMS Waterfront
Wilson Laney
Nils Larson
Benjamin Levitan, EarthJustice
Susan Linder
Carl LoBue, TNC
Dee Lupton, NC DENR
Samantha MacQuesten, NJ DEP
Kim McKown, NYS DEC
Jason McNamee, RI (AA)
Steve Meyers
Mike Millard, US FWS
Allison Murphy, NOAA
Brian Neilan, NJ DEP
Bryan Nuse
Christian Olla
Derek Orner, NOAA
Derek Perry, MA DMF
Zachary Pryor
Kathy Rawls, NC (AA)
Zoe Read, WHYY Radio
Paul Risi, KBCC, NY
Daniel Sasson, SC DNR
Dave Smith, USGS
Sommers Smott, VMRC
Joel Stoehr, Newschool, NYC
David Stormer, DE DFW
George Sylvestre
Craig Weedon, MD DNR
Peter Wenczel
Kristoffer Whitney, RIT
Angel Willey, MD DNR
Logan Williams
Wes Wolfe, *The Newsleader*
Harvey Yenkinson
Jordan Zimmerman, DE DFW
Erik Zlokovitz, MD DNR

The Horseshoe Crab Management Board of the Atlantic States Marine Fisheries Commission convened via webinar; Wednesday, January 26, 2022, and was called to order at 9:45 a.m. by Chair Joe Cimino.

CALL TO ORDER

CHAIR JOE CIMINO: Okay, good morning, everyone. We're here for the Horseshoe Crab Management Board. We've got some important items to discuss on our agenda today. I'll set a few ground rules for us. We'll go through our agenda, as is typical with the ASMFC process. During the Board meetings we allow for public comment on items not on the agenda, which I will be taking up soon.

If I do see a considerable show of hands, then we'll allow a certain amount of time for public comment. If you have public comment on an agenda item. As many people are aware, there is an item up for possible action regarding a Revised ARM Model. Then I will allow public comment on that agenda item later in the meeting, assuming we have a motion for a possible action.

Keep that in mind please, if you raise your hand for public comment on where it would be most appropriate. Another agenda item, or some ground rules I would like to cover is, we are going to have a presentation from Dr. John Sweka regarding the revisions to the ARM model, and we're going to follow that with a presentation by the Peer Review, which is going to be presented by Dr. Yong Chen of Stony Brook.

I want to have both of those presentations go in order, then we'll turn it over to questions from the Board. Just to staff and to Dr. Sweka and Chen. As that goes forward and you get questions, to make things a little easier, instead of having me as an intermediate. When the questions are directed to you, please just feel free to answer as they come in when we get there.

APPROVAL OF AGENDA

CHAIR CIMINO: With that I'll move on to the two Board consent items that we have on the agenda. The first is Approval of the Agenda. I hope I kind of laid that out for us. If there are any concerns or additions that someone feels are needed to the agenda, anyone on the Board, raise your hand now.

MS. TONI KERNS: I have no hands, Joe.

CHAIR CIMINO: We'll consider the agenda approved by consent.

APPROVAL OF PROCEEDINGS

CHAIR CIMINO: Also, we have in the package Approval of the Proceedings for the October, 2021 meeting, which you all should have had a chance to look at. Is there any concerns or edits that you feel are needed to the proceedings from the October meeting?

MS. KERNS: I have no hands, Joe.

CHAIR CIMINO: Very good, thanks.

PUBLIC COMMENT

CHAIR CIMINO: As I mentioned, this is a time where we will allow public comment on any items not on the agenda. If there are members of the public and you're able to raise your hand, please do so.

MS. KERNS: I don't have any hands, Joe.

CHAIR CIMINO: Okay. Well, with that we do have two important presentations, as I have mentioned. Caitlin, I don't know if you want to give an intro before we get started, and then as I said, I would like to go through both presentations before we take questions.

CONSIDER ADAPTIVE RESOURCE MANAGEMENT (ARM) REVISION AND PEER REVIEW REPORT

MS. CAITLIN STARKS: Sure. John Sweka will be presenting the revised ARM, and then following John's presentation, Yong Chen will be providing

the Peer Review Report. I think they'll give a pretty good background, so I will just let them go for that if that's all right.

CHAIR CIMINO: Sounds great, thank you.

PRESENTATION OF ARM REVISION REPORT

DR. JOHN SWEKA: Thank you, Mr. Chair, thank you, Caitlin for the introduction. This has been a work in progress for the past couple years, a lot of effort by a lot of different people on the ARM Subcommittee. First a little management history and assessment history. In 1998 the fisheries management plan for horseshoe crab was approved. In 2007, an effort began to develop a multispecies management approach for horseshoe crabs and red knots.

Then in 2009, the original version of the Adaptive Resource Management or ARM framework was peer reviewed. By 2012, Addendum VII was approved by the Board, and the ARM was instituted for management of horseshoe crab harvesting among the Delaware Bay states. By 2013, we did another coastwide stock assessment update, and then in 2019, we had another coastwide benchmark stock assessment. That was when we began this revision of the ARM framework.

Within the original ARM framework, the problem statement which guides our work, was to manage harvest of horseshoe crabs in the Delaware Bay to maximize harvest, but also maintain ecosystem integrity and provide adequate stopover habitat for migrating shore birds. Within the original ARM framework there were three possible red knot population dynamics models, with differing model weights, based on expert opinion, and our belief in each one of these three models.

There was a no effect horseshoe crab model, horseshoe crabs' effect red knot fecundity, and then horseshoe crabs' effect red knot survival and fecundity. On the horseshoe crab side of things, we had a model that was based largely on literature values. It started off as an age-structured model that we published years ago, and it was then converted to a stage-structured model. Originally, we had a possible selection of five harvest packages of optimal harvest, depending on the abundance of horseshoe crabs and red knots. These packages ranged from a complete moratorium for Package 1 to a 420,000 male and 210,000 female harvests under Package 5. Since the ARM has been implemented, each year we've always selected Package Number 3, which is 500,000 males and 0 females.

Why should we revise the ARM at this time? Well, basically it's time to. This is an effort to address critiques from the original peer review. We have a decade more of data for both species. The previously used software, known as Adaptive Stochastic Dynamic Programming is now obsolete. This reflects an evolution of our modeling techniques and expertise in adaptive management.

Also, the management board requested to include biomedical data in our ARM management, you know something that was largely ignored in the original ARM framework. Also, we have a problem with the previous knife edge utility functions, in that they tend to act as an all or nothing harvest control rule.

We've known this is a problem for years, and this was our opportunity to take a look at that and remedy some of the problems that occur because of the utility function. Our revised problem statement basically had the first part, which is exactly what the original problem statement was. But we added this text in red.

That was, and to ensure that the abundance of horseshoe crabs is not limiting the red knot stopover population or slowing recovery. This was an effort to acknowledge the fact that the red knots are now listed under the Endangered Species Act as threatened, and to highlight the close link between the species.

Just a quick overview of all of the changes, and I'll go into much more detail on these throughout the

rest of the presentation. We revised the horseshoe crab and red knot population dynamics models. We revised the reward function. As I mentioned, ASDP software is now obsolete, so we abandoned that in lieu of a new approach called Approximate Dynamic Programming for the optimization. This ADP approach can actually be run in readily available software, such as R.

Also, harvest recommendations would now be on a continuous scale, and one of the major advantages of the ARM revision is that it will lead to easier model updating with the collection of routine data that we collect each year. One thing to note is that the conceptual model of horseshoe crab abundance having an influence on red knot survival and reproduction remains intact, with the underlying intent in ensuring that it's not limiting population growth of red knots.

One of the terms of references that we've had were to reexamine our definition of Delaware Bay origin crab. We still define Delaware Bay origin crab as crabs that spawn at least once in Delaware Bay. Genetics data indicate that crabs everywhere from Cape Cod to Cape Hatteras are related, and tagging data indicates that there is movement of crabs along the coast.

Recent genetic evidence from Dr. Erick Hallerman at Virginia Tech, was used to estimate the proportion of the state's landings, discards and biomedical harvest that were of Delaware Bay origin. Given this new information, we updated the values from our previous assessments such that 100 percent of Delaware crab, 100 percent of New Jersey collect crabs are Delaware Bay origin. For Maryland it's 45 percent, and for Virginia it's now 20 percent. Moving on just conceptual diagram of how the revised ARM framework works. As you know we have a horseshoe crab component and a red knot component.

Within the horseshoe crab component our information and data from trawl surveys and harvest gets input into what's known as a catch multiple survey analysis. The results from this catch survey analysis are then also used in the red knot assessment model, which is known as an integrated population model.

Along with estimates of crab abundance, we account for spawning survey information, in particular the proportion of crabs that spawn during May, artic snow cover during the breeding of red knots, mark/recapture resight data, and then aerial counts and ground counts. The catch model and survey analysis in the integrated population model are then used to create forward projecting simulation models of both species.

These forward projecting models are then brought together in the approximate dynamic programming part of the model, and this is where the optimization for optimal harvest packages or harvest recommendations is made. First, I'll go into detail on the catch survey analysis. This was approved during the 2019 benchmark stock assessment for use as the best estimate of horseshoe crab abundance in the Delaware Bay area.

We've shown this equation before. Essentially our number of multiparous crabs is a function of the number of multiparous plus primiparous crabs in previous year decremented by mortality and catch. The catch in this case includes everything from bait, biomedical and dead discard estimates. The biomedical and dead discard estimates are a huge step forward over the previous ARM framework.

Also, we have natural mortality, which is estimated at 0.3. This was based off new analysis of tagging data, and we also found that there were no differences in natural mortality between the sexes. Some of the other inputs, obviously catch. The Delaware Bay origin bait landings, this is just a graph showing trends through time in those.

These are landings that come from Delaware, New Jersey, Virginia and Maryland, and takes into account that proportion of Virginia and Maryland's crabs that are of Delaware Bay origin. As you can

see in more recent years the very low landings of female horseshoe crabs, because of the ARM management that has been implemented for years.

Biomedical mortality, we have six facilities coastwide, and four within Delaware Bay. For the development of the ARM revision and the results that I'm presenting today, we used the coastwide estimates in this report, rather than Delaware Bay specific. This is to avoid data confidentiality issues.

If this new framework is approved for management, Delaware Bay specific biomedical mortality would be used when actually setting harvest recommendations on an annual basis. Our dead discards came from the Northeast Fishery Observer Program data, and we revised our methods from our 2019 benchmark stock assessment to have what we figure are better estimates of gear-specific mortality. Then there are just graphs of the total discards and then the proportion that actually die after being discarded for males and female horseshoe crabs. Our fishery independent surveys that go into the model include the New Jersey Ocean Trawl Survey, which samples waters along the coast of New Jersey.

There are the population trends, in terms of mean catch per tow we see during the spring of the survey. We also have the Delaware Adult Finfish Trawl Survey, which samples fixed stations throughout Delaware Bay, and here are the corresponding trends in the data that we see from that survey for males and females.

Then we also have the big one, you know that we really rely upon, and that's the Virginia Tech Trawl Survey. The area shown in the map here that boxes out the Delaware Bay area. That's the area that we used in this assessment. Here are the trends in estimates coming from the Virginia Tech Trawl Survey, in terms of partitioning the crabs out into newly mature females, which are primiparous, mature females, which are multiparous animals, and then the same for males.

When we put all of these data into our CMSA model, here are a quick view of the results that we get. Through time we can see a general increase in the number of multiparous animals. The primiparous animals fluctuate quite a bit, and those really crazy looking years between 2013 and 2016, those were the years in which the Virginia Tech Trawl Survey lost its funding, and we didn't have data from Virginia Tech during those years.

Our terminal year for this assessment, in 2019 we estimated that there were 9.3 million females within the Delaware Bay area. Here are the same results for males. Again, the years between 2013 and 2016, when the trawl survey went away. We have some pretty highly variable estimates of abundance for primiparous animals. But again also, the multiparous animals had increased over the past several years. The terminal estimate was 21.9 million total males in 2019.

We also conducted several sensitivity analyses of the CMSA model. These included varying discard mortality rates, natural mortality, survey weights of the three fishery independent trawl surveys that go into the model, and looking at coastwide biomedical mortality either included or excluded.

All of these sensitivity analyses showed that the CMSA output, in terms of total population size was very robust. You know female deviations from the base model range from plus or minus or plus 7 percent, and deviations for males range from minus 12 to plus 4 percent. Moving on to the red knots integrated population model, or IPM.

This model is used to estimate annual apparent survival of red knots, recruitment rates, and the influence of horseshoe crab on both of those. There are three components to the IPM, a mark/resight model, which is an open robust design model that estimates the survival probability and sight use while accounting for imperfect detection.

The data used here was from 2005 to 2018. A Count Model or state-space model, which estimates change in population size among years and the aerial count data, and then a life-cycle model, which describes the underlying population dynamics that link survival and recruitment to a change in population size. This is just a schematic of what the integrated population model looks like, and you can see the boxes around each one of these component models and where they share information.

For example, the Mark/Resight model shares information with the Count Model, in terms of the proportion of birds that are present in Delaware Bay each year. The Life Cycle Model shares information with the Count Model, in terms of change in population size from one year to the next.

Moving on to the results from the IPM. Here we have a graph depicting the apparent survival probability over years from 2005 through 2017. You can see it's fluctuated anywhere from greater than 95 percent to somewhat between 85 and 90 percent. The recruitment of red knots, the recruitment is in terms of a per capita recruitment rate, so how many new birds do we get two years from now for every bird that we have this year.

Recruitment is rather low throughout all of the time series. The black dots represent the mean, and the blue dots represent the median. Within the IPM, as I mentioned, we can examine the effects of covariate on these life history parameters of red knots. We included in the model the effects of the proportion of horseshoe crab spawning that occurs in May, and what effect it would have on survival, and the interaction term as we grab abundance and the proportion spawned in May.

Just the horseshoe crab abundance alone, Artic snow cover, how that may affect survival, and then finally how horseshoe crab abundance effects annual recruitment. Of these covariates that were examined, it was only the horseshoe crab effect on survival showed a significant effect. You can see the dots on this graph represent point estimates of the regression coefficient and the lines and whiskers represent the error about that.

It was just the abundance of horseshoe crabs and its effect on survival is the only parameters that did not overlap zero. It is a significant effect of horseshoe crabs on survival. This just shows a graph of how survival and recruitment are a function of horseshoe crab abundance. The top graph shows survival, and you can see over the range of horseshoe crab estimates that we have, you know there is a slight increasing trend in red knot survival.

But overall, the change in survival over the range of horseshoe crab estimates that we have, is only our expected survival only varies by about 2 percent. The overall mean annual survival of red knots is 0.93, and the overall mean recruitment for red knots was 0.063, and no effect of crab abundance on recruitment.

Moving on, we take these estimation models and then turn them into projection models. For horseshoe crabs it's based on the catch multiple survey analysis, but we also have to generate recruits in that model to turn it into a projection model. We use the mean recruitment of 1.7 million primiparous females and 2.2 million primiparous males. These were based on the entire timeseries of our estimates of primiparous animals, coming from the CMSA. Recruitment does decrease when total females are less than 3.75 million. We chose that number because that seemed to be about the lowest total females that we've estimated throughout the time series with the CMSA. The red knot projection model was based on the IPM, and we used MCMC output to link all those parameters in the IPM in the forward projecting model. The models were then linked and simulated together for the optimization, in order to find hard policy functions within the approximate dynamic programming.

I'll go into more detail about what a harvest policy function is. If we look at a reward function, this is

what we want to maximize in our optimization. The annual reward is a function of the utility of horseshoe crab, the utility of red knot and their product. Though we sum them in, also add in the multiplication of the two.

If we think of an ideal situation, this is when harvest would be near the maximum allowed, and red knot abundance would be above a threshold that we had maintained since previous ARM of 81,900 birds. If that's the case then everybody is happy. Harvest a lot of crabs, we have a high abundance of red knots.

Value to those utilities can range from 0 to 1, so that they're scaled so that red knots and horseshoe crabs are on an equal playing field. Ultimately, the total reward that you can get within a given year would range from 0 to 3. As an example, if we're able to harvest a lot of horseshoe crabs, red knot abundance is still high plus their product, we get a reward score of 3.

The advantage of this formulation of a reward function is that it prevents getting all of the reward from horseshoe crab harvest alone, and it accounts for, we include red knot abundance in this, because red knots do have inherent value to us as well. What the optimization does is try to move us from a situation where we have low utility on both species, or high utility on both species.

It's trying to push us from that upper left corner down to that lower right corner, so from 0 to 3. We want to maximizes the average total reward over some long-time horizon, for example a hundred years. Getting into specifically now what is inside of those utility functions. Here for red knots, the utility on red knots is a value-based decision.

What we've come up with, you know it's very similar to what was in the previous ARM, is that there is new utility for red knots, unless they get up to that threshold value of 81,900. In the revised ARM red knots start to have utility once you're at 90 percent of that threshold value, and then once you hit that threshold value, utility of red knots is equal to 1.

For horseshoe crab utility it's a little more straightforward, and it really boils down to economic decision, and that is the proportion of maximum economic value or maximum harvest. We've long considered that the value of a female horseshoe crab is twice that of a male horseshoe crab. What we can do is in any given year, two times the number of harvested female crabs plus the number of harvested male crabs, divided by twice the maximum allowable harvest of females and the maximum allowable harvest of males. That gets your utility.

The question is, okay how many crabs can you harvest to determine that horseshoe crab utility? Well, that is the function of what are termed the harvest policy function. We have three harvest policy functions, which are based on the abundance of female horseshoe crabs, the abundance of male crabs and the abundance of red knots. These functions are each defined by separate logistic functions, that is the equation up at the top. Within each one of these logistic functions, you have an alpha parameter and a beta parameter.

The beta parameter signifies the inflection point of these curves, and the alpha parameter signifies the slope at the inflection point. The alpha and beta parameter for each one of these curves is really what is optimized in the revised ARM framework. What comes out of these are a harvest factor ranging from 0 to 1, which then you modify by the maximum allowable harvest for each sex of horseshoe crab, to get how many crabs you can harvest in a particular year.

For males this is very straightforward, we just modify the harvest factor by 500,000, and that's our number. For females, we take into account both the harvest policy function for female horseshoe crabs, as well as the harvest policy function for red knots. We sum them and then subtract their product and multiply that by the maximum allowable female harvest.

The way the optimization proceeds is that we in a simulation environment, is that we randomly selected an alpha and beta parameter for each harvest policy function, and then in that simulation we apply the recommended harvest specified by that suite of alpha and beta parameters for a given level of horseshoe crabs and red knot abundance.

The reward is calculated for that year, and then the population is projected forward for an iteration. We then repeat this process over and over, based on that same suite of alpha and beta parameters. At the end of the simulation run, say 100 years, then some yearly rewards over that timed horizon. We have an algorithm in there that searches for the alpha and beta parameters from each of the three harvest policy functions that maximizes the average total reward over 10,000 simulations.

It's fairly computer intensive, but it still runs faster than what the previous ARM model did when its optimizing. The results in the output from the optimization. Here we have the harvest policy function for male horseshoe crabs. We see this curve that increases and then levels off at 500,000 as a function of male horseshoe crab abundance.

The blue area indicates the areas where we currently are, and where we expect to be over the next hundred years. Relatively high abundance, which also corresponds into relatively high allowable harvest of male horseshoe crabs, near 100,000. For females the picture is a little more complicated, because you have to look along two different axes. The X axis represents adult red knot abundance in thousands, and the Y axis represents adult female horseshoe crab abundance in millions.

We have these curves across a range of male, a range of female crab abundance and red knot abundance. What you can do is for example you would look at these curves. If we had 50,000 red knots out there and 10 million female horseshoe crabs, you know where they intersect on this graph. That band of color kind of tells you how many female horseshoe crabs can be harvested. With 50,000 red knots and 10 million horseshoe crabs, we would be just under 150,000 for an allowable harvest of female horseshoe crabs. The green dots on this graph represent the projected population of both species over the next ten years. You can see this is the range in which we might fall. This next series of graphs shows the predicted population sizes of red knots and male and female horseshoe crabs if the ARM were implemented and moving forward with our Optimal Harvest Policy function.

We can see the red knots on average the black line in this graph represents the median projected population size. They should increase gently and then asymptote at around 100,000 birds. The dark gray area represents the 25th and 75th percentile, and the light gray area represents the 2.75 percent and 97.5 percentile.

For horseshoe crab, we see that the female would likely asymptote at 7.3 million and the males at 14.9 million. Now you might look at this and think we are going to expect a decrease., but keep in mind there is a lot of uncertainty in these population projections, but based on the wide confidence intervals we would predict that currently we were probably at the upper end of the projected distributions here.

There is a chance that horseshoe crab abundance could decline, and not just because of ARM recommended harvest. Another question one might naturally ask, is okay well what effect does the ARM implementation have on our projections of red knot abundance? Well, this graph shows an overlay of two scenarios.

One, in green, where we implement ARM recommendations, so we have bait harvest plus our background harvest that we have no control over, and that’s the biomedical mortality and also the dead discards. The blue area is background harvest only, so no bait harvest allowed. We see for red knots that the projected distributions overlap nearly 100 percent.

In fact, there is only about a 1 percent chance that under ARM management we would result in fewer red knots than under no bait harvest at all. ARM management actually has a slightly bigger effect on horseshoe crab abundances, and you can see where the equilibrium levels of males and females horseshoe crabs are slightly less if we implement ARM management.

As an example of harvest recommendations, if we look at the years 2017, 2018 and 2019. The top part of this table shows recommended harvest under the old ARM framework. We see that there are the abundances of male and female crabs and red knots during this time period. The previous ARM obviously recommended 0 female harvest and 500,000 male only harvest.

If the revised ARM were implemented, and we had the same data from 2017 to 2019, we would now recommend roughly 150,000 female harvest across those years, and still 500,000 male harvest across those years. Moving on, one of the sections to report is stock status and conclusions. For the Delaware Bay population, you know there are no overfished or overfishing definitions as in a traditional stock assessment.

Our problem here is more of an optimal harvest, given the states of horseshoe crabs and red knots. This is dependent upon the underlying population dynamics of both species, as was shown. One thing we want to point out is that the major source of uncertainty in both species is the recruitment. You know you can change the values of recruitment and that has the greatest effect on population projections and recommended harvest. But the uncertainty on this should resolve as we collect more routine data. Some of the advantages of the ARM revision is the models for both species are based on empirical data from Delaware Bay, and it also incorporates additional horseshoe crab mortality sources.

The previous ARM model was based largely on literature values, and was more theoretical in approach. Model updating will be easily conducted with our routine monitoring data, and we could even update everything in these models on a yearly basis. There are not capacity limitations for ADP.

We don't have the same capacity limitations in ADP as we did in ASMP, and all uncertainty gets carried throughout the optimization. In ASCP our former software, we were limited on the amount of stochasticity on life history parameters we could include. The reward posting also now values both horseshoe crab harvest and red knot abundance, and you can't get full reward from one of those two only.

Another nice thing is that we can make harvest recommendations on a continuous scale. These could be truncated to maintain yearly consistency in management. For example, if the recommended harvest from the ARM revision was 130,000 females, you could round that down to 100,000 males, and that should allow some stability and avoid rapidly changing quotas from one year to the next.

For research recommendations, I'm not going to go through every single one that are outlined in the report. The complete list is in the supplemental report, which represents both research recommendations developed by the ARM Subcommittee and additional ones that were recommended by the Peer Review Panel.

We have them grouped based on future research, such as implications of climate change, observed egg density versus horseshoe crab abundance, you know something to further examine. Also, data collection, there are some more analyses that we could do with the Virginia Tech Trawl Survey, you know look into sex and stage information from Delaware/New Jersey trawls. I know both of them plan to start sexing and staging all crabs, and additional tagging efforts for both species, you know crabs and birds.

Other research recommendations pertain to data analysis and modeling, such as additional tagging analysis, regular model updating, and use of

evaluation of perfect information, in making management decisions. Now in all assessments we always strive to reach consensus among committee members, but unfortunately in some cases we can't reach consensus. We did have two minority opinions filed as part of our report, one by Larry Niles from New Jersey, and one by Wendy Walsh with Fish and Wildlife Service.

Just to briefly touch on those minority opinions. The key issues from Larry Niles were an apparent lack of trend and egg density data, and apparent lack of trend in the Virginia Tech Trawl Survey, and inclusion of New Jersey and Delaware Trawls in the Catch Multiple Survey Analysis. In the report we had detailed responses to their minority opinions. But just to summarize, you know for the first one from Larry Niles, we removed egg density data from consideration early on in the ARM process, even back in the original ARM. We have a direct link between horseshoe crab abundance and estimates of red knot survival that we can use, and also, I want to say that direct comparison to the early egg density estimates from Botton et al (1994) is inappropriate, because of differences in spatial and temporal sampling designs between what New Jersey does now compared to what Botton did back in the early nineties.

The lack of trend in Virginia Tech Trawl, I mean we do see an increasing trend in the swept area population estimates that are used as input into the catch multiple survey analysis. Also, including New Jersey and Delaware trawls in our assessment, you know they have both been long used as an index of abundance for horseshoe crab, and they were included in 2004, 2009, '13, and 2019 stock assessment for updates.

Also, it is very common to include multiple fishery independent surveys in a given stock assessment model for any species. Moving on to the Walsh minority opinion. She focused her opinion on the utility functions, stakeholder input, the survey weights going into the CSMA, and model uncertainty.

As far as utility functions, the previous utility functions were technically flawed, as I discussed, and resulted in an all or nothing harvest. The main problem with those was, if we would happen to hit that 11.2 million female horseshoe crab threshold, we would automatically bounce to the maximum allowable harvest under the old ARM.

We've known that was problematic for a long time. In recent years we have gotten close, based on Virginia Tech swept area. As far as stakeholder input, we do have a diversity of expertise on the ARM Subcommittee, Delaware Bay TC and the Advisory Panel, and also there will be a comment period on any draft addendum process that may stem from this ARM revision.

There is more opportunity for other stakeholders to weigh in. As far as the catch survey weights. We were never clear on what the appropriate weighting should be. This was a question that we had during the 2019 benchmark stock assessment. That Peer Review Panel then recommended that we have equal weighting, so that's what we went with in this ARM revision.

We also reached consensus early on in the ARM revision process to go with equal weighting, and this was also ultimately supported by the Peer Review Panel this time around. As far as model uncertainty, yes, our models are uncertain. You saw the population projections of each species, and there is a lot of uncertainty on those. But this is exactly why we do adaptive management modeling. I'll stop there, and I guess we'll hold the questions until Dr. Chen has given his report from the Peer Review Panel.

CHAIR CIMINO: Great, thank you, John. I hope that we can go forward in that manner. I think that might be helpful, especially if that presentation helps answer some of the questions that might be coming up. I always appreciate your background summaries. You know we went through the peer review for horseshoe crab, and we've come a long

way, and a lot of work has gone into this. I appreciate that presentation, and happy to turn it over for the Peer Review Report.

**PRESENTATION OF
PEER REVIEW PANEL REPORT**

DR. YONG CHEN: Thank you, Mr. Chair. My name is Yong Chen, I am a Professor at Stony Brook University, and I'm Chair of this Peer Review Panel. We have a Scientific Review Workshop that was held on November 16 to 18 last year, to review the ARM Revision, developed by the Horseshoe Crab Technical Committee and Subcommittee, and the ARM Subcommittee.

The Scientific Review focuses on models, input data quality and quantity and modeling outputs sensitivities and overall quality of the new ARM framework. Scientific review report, you can find the scientific report online. The Peer Review Panel consists of four members, including Dr. Erica Nol from Trent University in Canada, and Dr. Kelly Robinson and Dr. Justin Bopp from Michigan State, and myself from Stony Brook.

Collectively the Panel has expertise in horseshoe crab and migratory shore bird ecology, population dynamics and statistics, stock assessment, and adaptive resource management and structured decision making. The ARM Work Group developed models to project sex-specific horseshoe crab abundance, with inputs from horseshoe crab stock assessment model.

The Work Group also developed an integrated population models for red knot population dynamics and change reward function, and shifted to Approximate Dynamic Programming, which removed some constraints associated with the previous ARM framework, and I think John gave an excellent talk about the work.

Overall, the Review Panel concludes that the Workshop completed your Term of Reference, and the ARM division is significantly improved over the previous ARM framework, and that the ARM revision represents best available science, and is appropriate for providing management advice. That is the overall conclusion from the Review Panel.

We're giving a list of Term of References, so I will go one by one, and for the first Term of Reference the Panel concluded that proposed Catch Model and Survey Analysis model and a new projection model developed for Horseshoe Crab are appropriate for use in ARMs and the Panel also agrees that the CMSA estimated Delaware Bay horseshoe crab stock dynamics is robust, and appropriate for use in ARM.

The Panel recommends that Delaware Bay horseshoe crab stock be better defined, as some new genetic studies and some tracking studies indicated that the stock can be better defined. The full time series of recruitment estimates be used in the projection model to count for all possibilities. For the second Term of Reference, the Panel concluded that the proposed Integrated Population Model for red knot is a significant improvement over the previous model.

Analysis for the red knot population dynamics is appropriate for use in the ARM. The Panel recommends that the Work Group continue exploring the multi-state model that was used in the previous version of ARM, but it has some issues this time. The Panel also recommends that the red knot model parameters be updated frequently, particularly in the short term, to reduce uncertainties in the model and the decision for the horseshoe crab harvest. For the third Term of Reference the Panel concluded that data that was used are adequate for ARM revision to provide a horseshoe crab management recommendation. The Panel recommended the research be conducted to evaluate how changes in the environment and sampling time may influence horseshoe crab survey catchability. The Panel also suggested to evaluate an apparent lack of relationship between horseshoe crab egg densities by beach surveys and the red knot survival. To

update the assessment models with the new data when they become available for both species on an annual basis in the near future.

For a research recommendation, like John mentioned, there is a long mix there, but I kind of included four of them here. We think it's important. The Panel made a research recommendation for improving assessment methodology and data collection, and including revisiting ARM framework to evaluate the performance every 5 to 10 years.

Continuing funding the Virginia Tech Horseshoe Crab Survey Program, evaluating the new utility and harvest function, to make sure the broad representation of stakeholder's values, and using the expected value of perfect information to evaluate the effects of uncertainties in red knot and horseshoe crab dynamics on harvest decision. The Panel also reviewed two minority reports and majority responses in the report, and the Panel agreed with the majority responses in survey effectiveness.

The Panel also agreed with majority responses in reformulating utility and harvest functions for fast updates to reduce uncertainty. The Panel recommends that a mismatch between egg sampling and horseshoe crab spawning abundance be evaluated. The Panel also recommends considering uncertainties in horseshoe crab management, and ensuring current functions to adequately represent stakeholder concerns. Thank you, and I will be happy to answer questions.

CHAIR CIMINO: Great, thanks, Yong. Hopefully as we go through with the questions, if individuals want a slide pulled up that staff will be able to do that for us. With that, Toni, if you could help me out. I would like to see hands from the Board on questions regarding either presentation.

MS. KERNS: Yes, will do. I have no hands raised right now, Joe.

CHAIR CIMINO: Oh, you guys are good.

MS. KERNS: Now Joe, I have three hands, John Maniscalco, David Borden, Conor McManus and Rob LaFrance.

CHAIR CIMINO: Okay, we might need you to go one more time, Toni, but as I mentioned, Dr. Chen and Sweka, or if a question ends up going to staff. Please don't wait for me to relay, allowing you to speak. If a question is addressed to you, please feel free to answer. We'll start with John Maniscalco, go ahead, John.

MR. JOHN MANISCALCO: This question is for Dr. Sweka. First, thank you both for the presentations. You made a reference to some recent genetic work by Dr. Hallerman, and there was a comment I believe in maybe one of the minority opinions towards that 44 percent of your bait harvest was of Delaware Bay origins, and referencing personal communication from Erick Hallerman. The last tagging table I saw associated with the assessment said that there was less than 2 percent tag returns from New York and Delaware Bay or vice versa, and I am just wondering what the basis for that 44 percent comment was, and if you have any more information about the genetics connect policies that Dr. Hallerman is undertaking, thank you.

DR. SWEKA: Yes, Dr. Hallerman's analysis was samples were taken from landed horseshoe crabs. Certainly, a lot of them in the New York area originated from Delaware Bay or could be traced back to Delaware Bay. But for our tagging information, as you mentioned, what we see is, although a relatively large portion of New York's harvest might be from crabs that originated in Delaware Bay.

From the tagging information we don't see a large net movement to New York and then back to Delaware Bay. If you think in terms of metapopulation dynamics, what we have, what it kind of looks like is the Delaware Bay is a source population, and New York would be a sink population. You have a net movement of crabs from Delaware Bay up to New York.

Those crabs in Delaware Bay that move to New York are unlikely to ever move back to Delaware Bay. Essentially those represent almost the same as, you know just a natural loss of crabs from Delaware Bay as they move out. You know it represents near permanent immigration for those crabs. I don't know that we would want to make a leap, and it certainly merits further analysis that harvest in New York would be impacting the crabs that would eventually spawn in Delaware Bay.

MR. MANISCALCO: Thank you.

DR. CHEN: If I may add, and the Review Panel recommended further study to better define Delaware Bay horseshoe crab stock structure.

CHAIR CIMINO: John Sweka, if I may follow up. I think it has been a while before this type of genetic composition was used to update the proportional harvest. I am curious, is there a standing research recommendation or is there guidance on how often that should be updated? Maybe even as Dr. Chen suggested, looking into that, like maybe the number and timing of samples that were used for the current work and exploration of that.

DR. SWEKA: Well, we certainly have research recommendations to continue looking into that. As far as specific timing or how frequently that should occur, Joe, we haven't got into the whole detail on that research recommendation.

CHAIR CIMINO: Thank you, and my apologies to David Borden and the others who are ready in the queue there for jumping in with my own question. I believe David Borden is next.

MR. DAVID V. BORDEN: Two quick questions. I was just wondering whether or not there is any evidence that the center of abundance on horseshoe crabs has shifted along the coast. There are a number of other species where we documented that. If I could get an answer to that, and then the other question is, is there any evidence that natural mortality rates have changed over time, so those two questions, thank you?

DR. SWEKA: Okay, to your first question about the center of abundance. We haven't looked specifically at that, but I would say that it doesn't appear that there have been. If we look at the New Jersey Ocean Trawl Survey and the distribution of their catches, we see that throughout the time series that we have available to us.

The majority of their catches occur close to the mouth of the Delaware Bay, and the farther away you move the lower their catches are. That seems fairly consistent, so I guess that would lend some support that the center of biomass of horseshoe crabs hasn't shifted. To the second question. Could you repeat that again, please?

MR. BORDEN: Second question was whether or not there is any evidence that natural mortality rates have changed over time.

DR. SWEKA: Right now, we don't have any evidence of that, but the available tagging data doesn't go back in time really all that long. You know to come up with our current estimates of natural mortality, we focused on those years of data since the state of New Jersey put their moratorium in place.

You know feeling that that was most representative of recent years, and would also eliminate the most potential for confounding impacts of any bait harvest going on out there. At this point in time, I don't think we have strong indication of any trends in natural mortality, or at least the data that we have available isn't amendable to actually looking at that.

CHAIR CIMINO: Thank you, David. Go ahead.

DR. CHEN: I just want to mention that during the review, actually the Panel requested a part of positive tows in the survey for horseshoe crab, and we didn't see any temperature on that, so that is probably an indication that this issue has not been changed. I just want to add it.

CHAIR CIMINO: Thank you for the addition. Toni, please correct me if I'm wrong. I had Conor McManus and then Rob LaFrance next.

MS. KERNS: That's correct, and just to let you know, Roy Miller put himself in the queue as well.

CHAIR CIMINO: All right, very good. Conor, go ahead, please.

DR. CONOR McMANUS: I just want to first commend the technical group here for all the work that they've done, a symbol of a lot of new advancements that I think (faded) proved to be appreciative of that. Two questions from me. The first is regarding the weighting for the surveys.

Maybe for John. If you could remind me what the impact of the weightings were on our imprints for crab abundance by sex, just the magnitude higher or lower, and maybe could you speak to other tools that were evaluated to understand the weighting or infer weighting, or incorporate catchability of the surveys to the weighting? Just a little bit more for the confidence of the minorities report.

DR. SWEKA: Sure. In the 2019 benchmark stock assessment we applied a weighting system that was based on a hierarchal model that took all three of these surveys, and it was the inverse of their standard deviation in that model. How much variance was explained by each of those surveys in that combined hierarchal index.

We used that originally as a weighting system, which it gave the Virginia Tech Trawl Survey the highest weight, and less weight to Delaware/New Jersey Trawls. During the peer review in 2019, the Peer Review Panel had a question about, if we use that weight, which is based on a variance, and then we also had CVs of each individual survey in the CMSA model, are we basically double counting the variance of each survey?

There was a lot of discussion about that during the 2019 benchmark stock assessment, and we came around to consensus between the Stock Assessment Subcommittee and the Peer Review Panel that it's probably most appropriate not to weight either one, or have any weighting for each individual survey.

We carry that through to this new ARM revision, and we've reached consensus among the Subcommittee early on that we shouldn't weight one versus the other. In the end in the minority opinion, yes there was a desire to then put weights back in. We actually tested the sensitivity of model results to that. We used the original weights from the 2019 benchmark stock assessment, which would be completely inappropriate to put back in now.

We also did a sensitivity analysis on the, one suggestion by the current Peer Review Panel was perhaps weighting based upon the amount of area sampled by each survey, so we did that. The area weighting method almost put Virginia Tech Survey and New Jersey Ocean Trawl Survey on equal footing, because although the distributions of their sampling area don't overlap completely, in terms of area they were about the same.

In the end, it really doesn't make that much difference. As I said in the summary of the results of the sensitivity analyses, the female horseshoe crabs over everything that we did, you know we might range, our final terminal year abundance estimates of female crabs might vary plus or minus 7 percent at most.

Also, I can certainly understand the desire to more heavily weight the Virginia Tech Trawl Survey, because that survey was typically designed to capture horseshoe crabs. The gear is designed to more effectively sample horseshoe crabs. You can see that in the raw data. The average catch per tow from Virginia Tech Survey is greater than that of the other two surveys.

If a crab is encountered, Virginia Tech is more likely to catch it. Now having said that, I mean all of the

surveys suffer from the same problem, in terms of interannual variation. In all of them we can get these extreme up and downs, you know from one year to the next. Basically, it boils down to being in the right place at the right time to catch crabs. All the surveys suffer from that. Some years you catch quite a few, you hit the hot spots, some years you don't. In terms of reflecting the population, all of our surveys, our underlying assumption is that whatever your catch per tow is, you know your index of abundance. Whatever that is, it's proportional to the total population size. At this point in time, and the results of the surveys are correlated with one another, especially since approximately 2010.

We've seen an increase in abundance in all the surveys. The current Peer Review Panel agreed, you know we had a lot of discussions about weighting systems, and eventually the current Peer Review Panel made the suggestion, and recommended in their report that as long as we still have this correlation, the equal weighting that we ultimately used is appropriate at this time.

DR. McMANUS: Thanks, John, I really appreciate that. Very thorough and helpful. I guess my other question is, you cite that some of the greatest uncertainty perhaps in the results that tie to recruitment. I guess I was just curious, similar to some of the red knot kind of model covariate work you were doing.

Have you looked at other indicators in the environment or from outside of maybe regular population dynamic models that could help inform recruitment in your model? Do you see trends in some of the other things that would be driving recruitment external to red knots that may be used to inform the model?

DR. SWEKA: Yes, you know a while ago we did use the Virginia Tech Trawl Survey data and apply to general linear model to account for covariate, thinking that perhaps fluctuations in catches might be due to the environmental effects, and maybe those differ between primiparous and multiparous crabs.

We attempted that. The results of it didn't really change much. Yes, I think there is more that we could do, and some of the research recommendations from this Peer Review Panel, in terms of the spatial distribution and habitat suitability modeling for horseshoe crab could come into play in the future.

For red knots we have those covariates that we evaluated in the IPM of the effect of crabs on red knot recruitment. Also, Artic snow cover and so on. We still retain those in the model. We didn't just completely drop those. I mean right now they're not informative, because there is no effect of them.

But they are still retained in the model, if as we collect more data into the future, we start to see that those effects become evident. It could just be still a matter of data limitation that we can't discern those effects right now. But they are contained within the model, and as we collect more routine data and update our models. If those start to show some sort of effect on red knot recruitment, we should be able to tell that.

DR. McMANUS: Great, thanks.

CHAIR CIMINO: Great questions, Conor, thank you for that. I especially appreciate, you almost got someone named Dr. John to say, right place but the wrong time. I think next is Rob LaFrance.

DR. ROB LaFRANCE: Thank you for the presentation today. My question was very similar to what was just asked about the trawls and the weighting. In the minority report there was a weighting suggested. I just want to know whether that model was run. I think Wendy Walsh recommended 0.59 percent, 0.16, and then 0.25. Did you guys actually run those scenarios? Then I have a follow up question on something different.

DR. SWEKA: Yes, that was exactly one of the scenarios that we ran in the sensitivity analyses, and there is a table in the report and in the

supplemental report of the results of that. That weighting scheme came from the original weighting that was sent to the Peer Review Panel for the benchmark stock assessment in 2019, which ultimately, they suggested we don't weight using those.

DR. ROB LaFRANCE: That's in the supplemental report, thank you. My larger, sort of bigger question is this issue of the egg masses. It seems to me that for a number of reasons they are not really being included in the overall analysis and modeling. I'm just wondering if you could take a little time and explain what some of the problems with that approach are, and I think I see recommendations that you would like to do more with that going forward. I'm just trying to get a little better understanding of that, thank you so much.

DR. SWEKA: The egg density data, you know they are highly variable and subject to not only the abundance of spawning horseshoe crabs, but also the spatial and temporal variation that we see in the effects of wind and wave action on the beaches, and also the timing of spawning. The timing of peak spawning is when egg surveys are conducted.

A lot of things can influence your major egg abundance. The use of egg density data as a predictor of red knot survival was abandoned, even in the original ARM framework, just because of the high variability of egg density data, and we also found a direct link between female crab abundance and red knot survival.

That relationship still exists in this ARM revision. Another point is that our management of horseshoe crabs directly effects crab numbers not egg density, which are subject to a host of all those other factors. Oftentimes you see the comparison to those early numbers by Mark Botton, back in the early nineties, but there are differences between how egg density data is collected now versus the sampling design that was implemented in Botton's study in the 1990s.

A direct comparison between the two is probably not appropriate, and as you said, we do make recommendations. Eggs certainly are the direct input for the red knots, you know that is what they're actually using. We do have research recommendations to continue to look at the egg density data, see if we can come up with any sort of predictable models between crab abundance, spawning beach surveys, that egg density and red knots.

Now, if you think about that, that is a lot of steps and a lot more sources of uncertainty. Perhaps we could do that into the future, as we gather more data and examine that closer. But right now, the most efficient way to see what's the impact of horseshoe crab on red knots is that direct jump from crab abundance to red knot survival, which we do see a significant relationship with.

DR. LaFRANCE: I just would add that maybe taking a closer look at standardizing how you actually analyze big masses might be helpful as well, just because I think if there was a standard approach as to how to do it, you might be able to get rid of some uncertainty, just a thought.

CHAIR CIMINO: Thank you, Rob, appreciate that. That's kind of what put us on this journey, is making sure that there were more eggs available on the beaches, so it's an important question, and something we need to continue to look at. Roy Miller, you're next.

MR. ROY W. MILLER: Dr. LaFrance's question answered the very thing that I was going to ask about as well, so thank you.

MS. KERNS: You have Mike Millard, Shanna Madsen, and I think Conor's hand is left over from before, but I'm just double checking.

DR. McMANUS: That's correct, thanks, Toni.

CHAIR CIMINO: Okay, go ahead, Mike.

MR. MIKE MILLARD: A quick question for John. John, about half way through your presentation you put up an analysis, that regression analysis that suggested red knot survival was significantly related to horseshoe crab abundance. Then later you showed those projections of the red knot population with horseshoe crab harvest and without horseshoe crab harvest, and they were essentially 100 percent concurrent. I can see where those two conclusions, a lot of people in the public and some of us around the table might find those two conclusions inconsistent. Can you unpack that a little bit, and tell us how that can be?

DR. SWEKA: Sure, Mike. In the strictest sense if you have a decrease in horseshoe crab abundance you would have a decrease in red knot survival. But at the same time there is a lot of variation about that relationship. Over the range of female horseshoe crabs that we have observed, or estimated by the CMSA, the effect on survival is rather weak.

It is statistically significant, but there is not a big effect. Going from 4 million to 12 million crab causes a 2 percent difference in the annual survival, with quite a bit of uncertainty about that. When you have the uncertainty about the relationship between crabs and red knot survival, you also have uncertainty and variation in natural mortality of horseshoe crab. You have uncertainty in the recruitment of both horseshoe crabs and red knots.

Taking all of that together, the amount of uncertainty due to other factors really dwarfs the relationship between crabs and birds, in terms of survival. Within the simulations that go into the ARM optimization, the expected distribution of red knot population growth under the ARM is really indistinguishable from distribution under a no-bait harvest scenario. I don't know, hopefully that answered the question, or at least puts it in perspective more.

MR. MILLARD: Yes, that helps, thank you.

CHAIR CIMINO: We have Shanna Madsen next.

MS. SHANNA MADSEN: I thank you very much, Dr. Sweka for this presentation. It was really informative, and thank the whole assessment team for doing all the work on this. I think Mike asked a similar question to the one that I was going to ask. I'm asking about the second graph that he was referencing, which I think was on a predictive population size slide.

On that slide he showed those predicted populations for red knots and both male and female horseshoe crabs on, and then the differences when you allow bait harvest as well as the biomedical harvest. I guess I was questioning, what is that bait harvest? What is the value for that bait harvest that you were using in those graphs? Is that the maximum allowed harvest by the model?

DR. SWEKA: That would be the harvest as recommended at any point in time, based on the harvest policy. If during the course of one of those simulations the crab population or bird population declined, harvest at that point in time would also decline. What those represent is the implementation of those harvest policies, not a specific harvest number.

Really, it's simulating the management system and how harvest changes on an annual basis, depending upon the abundance of crabs, birds and both sexes of crabs. But overall, yes, the absolute maximum you could harvest at any given point in time would still be 210,000 females and 500,000 males. We haven't changed that maximum allowable harvest from the previous ARM framework.

MS. MADSEN: Thanks, John, that clears that up, thank you.

MS. KERNS: That is the queue, Joe.

CONSIDER MANAGEMENT RESPONSE TO ARM REVISION AND PEER REVIEW REPORT

CHAIR CIMINO: Got you, okay. Well, that's a great discussion. Two very well thought out

presentations to start us off with, and then a round of very important questions, I think. We do have an agenda item for considering management response. I'll turn it over to Caitlin, I know she has some slides for that.

MS. STARKS: I guess I will make one note before I put up the slides for management response. Typical to our normal consideration of stock assessments, I think procedurally for this we would want the Board to consider accepting the ARM revision for management use, and then subsequent to that consider a management response. I just wanted to make that note before I put these slides up here for you.

This is going to be very quick. I just wanted to give the Board a couple of things to guide the discussion here. For the management response for this ARM revision. The first thing to note is that the current ARM framework that we use for the Delaware Bay management was implemented through an addendum, Addendum VII to the FMP in 2012.

Therefore, in order to revise the framework and make the improvements that were recommended by the ARM Subcommittee and the Peer Review, we would need to approve a new addendum. If that is the desire of the Board, the Board can consider initiating an addendum today to consider implementing changes to the ARM framework, as recommended by the ARM Subcommittee and Peer Review. Then as John presented and we discussed earlier, these are the main changes that were made to the ARM framework in the revision, and what should be included in the addendum, so that the definition of the double-loop process, the definition of harvest packages, the lander values, which are the percent of each state's harvest that comes from the Delaware Bay stock.

State allocations of the total Delaware Bay harvest, and then adaptive management recommendations for allowing future changes to the ARM framework to occur outside the addendum process, and then as always, if desired the Board could consider other issues through the addendum as well. I just wanted to quickly give that as a context for considering a management action. That's all I have. But like I said, I think the first step would be to accept the ARM revision for management use.

CHAIR CIMINO: I think that now is the appropriate time to do that, but I do want to speak to it for a few moments. I think all the Board members are well aware of the ASMFC process that we're dealing with here. As I said, we had two great presentations on all the hard work that was done to improve this model, and a peer review that accepted those terms of reference in this model for being appropriate for management use.

There has been a considerable amount of media. We had one or two written comments that made it in time for our materials, but since then we've had a few others that expressed, in particular a concern that we would be taking action today to allow harvest of female crabs in the Delaware Bay.

I think it's important to note that that is not the decision before the Board today. But whether or not this model represents the best available science, and if it's the most appropriate for use. It's a significant enough change to our management process that it's going to require another addendum to the FMP. That of course will kick off an entirely separate chance for the public to comment on this model for management use.

What Caitlin is laying out before us is, as we start this addendum, are there other items that we want to add, which could be important? I would say that with so much that we're deciding on today, it may be difficult to fully flesh out that decision. For just a second, I'll take off my Board Chair hat, and put on my Vice-Chair hat for the Commission and say, there were discussions during our Executive Committee this morning.

ASMFC staff are going to be very tasked with a great number of possible addendum and amendments

that are moving forward for management plans that will require a tremendous amount of public hearings, or could between now and May. I would say that although I would like to have a vote on whether or not to accept this model, you know to fully flesh out and kick off the Board's needs for this addendum, may not need to happen today.

We might be able to suggest that, or a motion that starts that process, but the Board may have time to gather their thoughts and have another discussion at a future meeting on all the things we would like to see a plan development team include into this. That is something I haven't talked a great deal about with staff, but I think is something that we should consider as we have this discussion, and entertain a motion. Let's open this up for discussion. Thoughts on where we are, interest in moving forward with accepting the Peer Review and potentially starting a new addendum.

MS. KERNS: I have John Clark.

CHAIR CIMINO: Okay, John, let's start us off.

MR. JOHN CLARK: Joe, we've just had a presentation on the phenomenal work of science here done by the ARM Panel, the Peer Review. It's clearly the best available science, and I fully agree we need to accept this for management use. But as you said, the actual management part, what we would actually put in the addendum is a lot of thought has to go into that too. I am in full agreement with you that today is the time for us to approve this for management use, but as far as the addendum, give it some more time to think of all the alternatives we want in that.

CHAIR CIMINO: Thank you, John, Toni, other hands?

MS. KERNS: I have Pat Geer.

MR. PAT GEER: I agree with what you said and what Mr. Clark said. I think we need to approve this ARM Revision today. I think they did a great job on it, and it's the best available science. But I agree with you, I think given what we heard this morning in the Executive Committee, as many as 40 public hearings over the next few months. I think we should take our time and basically come back together in May and have a discussion on what we want this addendum to look like. I agree with what's been said so far.

CHAIR CIMINO: Great, thanks, Pat.

MS. KERNS: You have Rob LaFrance and then Emerson Hasbrouck.

CHAIR CIMINO: Go ahead, Rob.

DR. LaFRANCE: I guess I just have a question on what we, by accepting this for management purposes, that just means we accept that the work has been done and we're going to consider it moving forward, but nothing of substance would happen with it, until such time as we passed another addendum? Is that the correct understanding?

CHAIR CIMINO: Yes, this is one that I think I'll start. I would appreciate staff helping me out, especially if I misspeak on where I start. We would be accepting that this is the best model available to produce estimates of what we're trying to get at here. The ARM model is something that has been in place for several years now.

We're looking at that utility function with trying to achieve a harvest package that allows or suggests the safest harvest levels for horseshoe crab that don't inhibit red knot survival. We need something there. We have a peer review that suggests that this model is the best available to spit out a harvest package. As this moves forward, that will continue to get a range of options for the harvest packages, and that is something that will go into the addendum for us to look at. Toni or Caitlin, anything I missed or that could be covered better?

MS. STARKS: You did a good job, Joe, and I think the main takeaway to the question is that yes, we would have to approve an addendum in order to implement the ARM Revision.

DR. LaFRANCE: Toni, just a follow up then. Basically, what we're saying is if we accept this today, we're saying that because of the work that's done, and because of the Peer Review, we accept it as the best available science on this particular issue. However, in terms of moving forward on management, for example, whether the Board thinks that the numbers are correct, and whether we want to get a greater detail understanding of the risk associated with different packages. That still has to work through an addendum process, is that right?

MS. KERNS: Rob, I wouldn't couch it as we think the numbers are correct, because I think by accepting the assessment for management use you are saying it is the best available science, so in that sense that you are agreeing with the information that is in the ARM review. How you utilize that for management then, is a decision that you all are going to need to make through the management process.

DR. LaFRANCE: That's the clarification I was looking for, basically, the difference between accepting. I don't like what happened in menhaden, where they accepted some information, and then we had to figure out what our risk analysis, our risk tolerance was going to be, before we decided on certain management choices. I see this following that same process, is that fair to say?

MS. KERNS: Correct, yes.

CHAIR CIMINO: Yes, it's a good point. You know these are the only two species that we've attempted to tackle at a multi-species modeling level, and there were recommendations from the Peer Review on the TORs regarding stakeholder values. Moving forward we have to remember that that is not only part of the management decision, it's actually part of the model.

It's important to consider that, that this isn't just the model said that it's safe to harvest some female crabs, and therefore you have to harvest female crabs. It's an important distinction that this is a more complicated process than that, for sure.

MS. KERNS: Joe, just to get your queue back, you have next Emerson Hasbrouck, then Dan McKiernan, followed by Pat Geer and then Chris Wright.

CHAIR CIMINO: Go ahead, Emerson.

MR. EMERSON C. HASBROUCK: Based on your response to the previous couple of questions, are you ready for a motion then to approve the ARM revision for management use at this time? If not, you can come back to me, if you want to have some more discussion.

CHAIR CIMINO: Yes, we have a few hands in the queue, and we're doing pretty good on time, so let me clear the hands that we have, Emerson, and then I'll come back to you. Dan, go ahead, please.

MR. DANIEL McKIERNAN: Emerson kind of stole my thunder. I was wondering if you would be ready for a motion. It seems to me that this was an outstanding piece of work, best available science. I'm just trying to think forward about timing of new proposed management measures, and the seasonality of harvest. If we were to undertake a new addendum, is it expected that we would accomplish it in time for the 2023 harvest seasons, or would it likely extend into 2024, for the first time we would see any modifications of management?

CHAIR CIMINO: I think at an ambitious timeline, we would have been revisiting accepting a new addendum at the October meeting, which is our last meeting of the year, when we're typically setting harvest specifications. I think that slowing that down could certainly result in kind of a status quo methods for setting the specifications for 2023.

But keep in mind, and again that's so important of a consideration for all the individuals who are so concerned that a new model means a changing of how we're going to manage this species in the Delaware Bay. We could take an ambitious timeline, and have this model in place, but still choose to stay with the status quo harvest package, because of all the uncertainties expressed so far, and that we think that's the best choice.

I think there are some other items that we've talked about. We had a pretty good discussion during the October meeting last year on what should be included in this addendum. We might want to take some time, and kind of really work on that and see where we end up.

MR. McKIERNAN: That sounds like a future horseshoe crab board meeting to kind of set the parameters for that. It would take a few meetings. I think it sounds like at this point you would be looking for a motion to accept the revised ARM, and I would be happy to do that once you clear the queue.

CHAIR CIMINO: To some extent, you know we've had some members speaking in favor of that. I've kind of made it clear that as we move forward, even with just information that we heard this morning, that that is where I'm kind of leaning as Board Chair, but I'm certainly willing to entertaining any motions if folks feel otherwise. With that we'll go to Pat Geer.

MR. GEER: I think Emerson and Dan stole my thunder, as far as a motion is concerned. I was just going to make a motion.

CHAIR CIMINO: Okay, thanks, we have Chris Wright.

MR. CHRIS WRIGHT: Yes, I'm in support of the ARM, but my question was related to some of the earlier questions, in regards to timing, and whether or not we were going to try to get an addendum done before 2023, and that timing, and whether or not we were going to assign anything to the PDT. But I guess we'll just move forward the way we're going right now.

CHAIR CIMINO: I do want to say once again that I certainly showed my hand, but I'm not trying to strong arm the Board here if there was an interest in moving this forward more quickly, then I think we can certainly have that discussion, whether in the form of a motion or a little less formally. But not everyone was privy to the Executive Committee. I know not everyone tunes in, necessarily.

As far as what staff is dealing with, we have menhaden and striped bass amendments that have some pretty big issues in them. We're looking at a Rec Reform Initiative, and potentially we're talking about dozens of public hearings between now and May, without even tackling horseshoe crab. I want to put that out there. Toni, if no one else in the queue, I'm going to go back to Emerson.

MS. KERNS: I don't have anybody else in the queue.

CHAIR CIMINO: Emerson, go ahead.

MR. HASBROUCK: Does staff have a motion prepared to accept the ARM revision for management use? I move to accept the Revised ARM Framework and Peer Review for management use.

CHAIR CIMINO: Thank you, do we have a second?

MS. KERNS: Dan McKiernan.

CHAIR CIMINO: Thanks, Dan, any discussion on the motion?

MS. KERNS: We don't have any hands raised at this time.

CHAIR CIMINO: As I mentioned, if any motions come before the Board on possible actions today, I wanted to also give the public a chance to speak, so I will open it up now to the public, if they have any questions or things that they wanted to comment on regarding the motion.

MS. KERNS: Just giving it a second. I currently don't see any hands raised. Just to make sure, everybody who is not familiar. You click on the hand button, the little icon that looks like a hand to raise your hand. Still no hands.

CHAIR CIMINO: Okay, thank you, Toni, I appreciate that. Caitlin, with that, is there anything else you need regarding this, or Toni, since we did kind of break this into two elements. Do we need a discussion on when we might pick this up? Is there the possibility of getting on the agenda for the next Commission meeting?

MS. KERNS: Joe, I think there is definitely the possibility of getting this on the next Commission meeting. If it is the intention of the Board to initiate an addendum, and you want the PDT to start to do some work. I don't see an issue with at least making that motion to initiate and have the PDT perhaps start some progress. You know obviously with the time allowed that we will have, depending on all the different management documents that we talked about this morning in Executive Committee. If that is something that the Board does want to do, then after you dispense with this motion here, you could consider a motion to initiate an addendum. Obviously, addendums can have a longer timeframe for development process. It doesn't have to come back to the Board immediately. The PDT could start looking into some things, and the Board could provide additional feedback at the May meeting.

CHAIR CIMINO: Great, okay, and so thank you for reminding me that there is a motion on the board. Let's do that then, let's dispense with that first. Is there any objection to this motion, please raise your hand?

MS. KERNS: I see no hands raised in objection.

CHAIR CIMINO: Okay, great, thank you. Again, you know there was a lot of public interest in this process, and I think some misunderstanding to how we work with this stuff. We don't kind of keep a standing Plan Development Team that works on fishery management plans or their amendments. Typically, we need to collect a new group of individuals from the states every time we start a new amendment or addendum. A motion here wouldn't necessarily put us back on a fast track, but they would have at least one standing pass.

They know that they need to go back to what we did for inclusion in the FMP for the original ARM model in 2012, and kind of retool that for a new addendum. Then they will be standing by for any other tasks that come from a future board meeting, hopefully at our very next board meeting. Caitlin or Toni, correct me if I'm wrong, but the establishment of the PDT, we will go back, states will nominate members, and through an e-mail process those members would get included, is that correct?

MS. STARKS: Yes.

MS. KERNS: I just wanted to jump in. Joe, can you just say that the motion carries.

CHAIR CIMINO: Keep me honest here, Toni. The motion carries, it was passed by consent. Thank you. Caitlin, I think, confirmed that for us, Toni, and if any members of the Board are interested in allowing a PDT to get formed to start some of this work, I think spreading this out could help alleviate some of staff's task assignments as well. Happy to entertain a motion for that.

MS. KERNS: You have John Clark.

CHAIR CIMINO: Go ahead, John.

MR. CLARK: I would be glad to make that motion. Is there an already made motion? Oh, there we go. Yes, I would like to make the motion to initiate an addendum to consider incorporating the revised ARM Framework for management of the Delaware Bay stock. Does it have to say into an addendum?

MS. KERNS: No.

CHAIR CIMINO: Toni, do we have a hand for a second?
MS. KERNS: We do, Mike Luisi.

CHAIR CIMINO: Thank you, Mike. Any discussion on the motion?

MS. KERNS: We have Rob LaFrance.

CHAIR CIMINO: Go ahead, Rob.

DR. LaFRANCE: I just wanted to make sure I understand this. All we're doing at this juncture is just going around the states and pulling together a PDT. Because I know in other PDTs I worked with, they like to have specific questions that they need to answer, and come back with some specific report. As long as the idea here is just to get something started, I'm fine with that.

I also would be interested, if Caitlin wouldn't mind sharing to all the members of the Board her PowerPoint screen there. I think that was very helpful for folks. Anyway, that's what I just want to get clarification on if I could. Is that all we're doing, just setting it up?

CHAIR CIMINO: Yes, I thought I was clear that that is exactly what I was trying to explain before asking for a motion. We have a motion before the Board, I guess we will have to turn to the maker and seconder of the motion if that's also their intent.

MS. KERNS: Joe, are you saying that you all don't. Once the PDT is formed, you all do not want them to do any work on the addendum between now and May? I think there is a list of things that Caitlin had provided in her PowerPoint that they could at least start to explore, and bring perhaps comments back to the Board at that time, just to at least, as you said before, spread out the work a little.

CHAIR CIMINO: Yes, well, Toni, they certainly have the assignment of adapting or changing the wording of where we are for management using Revised ARM Framework. I guess, if there are other assignments related to the ARM, then I would think that would be included in this task. I was thinking other elements that were listed by Caitlin.

If they have time between now and then, I don't think it's harmful. I think the biggest concern was, are we moving too quickly with a new model? I guess again, that might be up to the maker and seconder of the motion, are there other tasks included, and if so, we may need to revise this motion.

MS. STARKS: If I could add something, Mr. Chair.

CHAIR CIMINO: Yes, please, Caitlin. Go ahead.

MS. STARKS: I just want to kind of give everyone my perspective on what this would look like if this motion were to pass. As discussed, we would form a PDT. I think we have a pretty solid foundation for getting the addendum started, given that the ARM Revision is complete. We have recommendations from the ARM Committee and Peer Review for what is the best available science, and what should be modified from the old ARM Framework. I think the task that the PDT could work on between now and the next meeting, would be identifying what pieces of that might be decision points for the Board in the addendum, versus items that would just be updated automatically as part of the model. Things that are more technical in nature and wouldn't necessarily require a decision by the Board. Does that kind of give you a better idea for a sense of what we could work on with the PDT?

CHAIR CIMINO: Yes, absolutely. Again, you know there were some very important recommendations in my opinion in the Peer Review Report as well. Yes, I think that's a great way to lay it out.

MS. KERNS: Joe, you have Mike Luisi.

CHAIR CIMINO: Yes, go ahead, Mike.

MR. MICHAEL LUISI: Yes, I seconded the motion. I was planning to make a comment after I seconded that I liked the language that Caitlin used in her

presentation regarding initiating the addendum, and it included language, it involved the Peer Review and the other recommendations.

It was a little more clear as to painting a picture, not just for us today, but for anybody who is going back to read the actions that this Board took today. I think it would be more clear if that language was incorporated into this motion before we vote on it. That way that list that was generated in the presentation kind of sets that basis for what the PDT would start to look at, including the Peer Review recommendation, if that makes sense.

CHAIR CIMINO: I think it makes a lot of sense. I think it's a good potential addition. I think you know Robert's Rules better than I, so perhaps you or Toni could. Was that suggested to be like a friendly amendment to this?

MR. LUISI: Yes, when I raised my hand to second, I was going to make the point. But we jumped in. The conversation never came back. I raised my hand but then it came back down. I was going to ask John. Caitlin, there you go. That's the slide I was looking at. John, would use consider using the language below that Caitlin went through as establishing a little more detail in your motion? I would be happy to second that.

MR. CLARK: Yes, I'm fine with that, Mike. I assume that especially given Caitlin's follow up that the tasks that she had outlined there would be what the PDT was looking at. But I agree with you. To make it more clear what we're planning to do that would be great, I'm fine with that.

MR. LUISI: Yes, so I think that last part of that motion then, as recommended by the ARM Subcommittee and Peer Review Panel would fit in nicely with the motion that John made. I'm certainly willing to second that as well.

CHAIR CIMINO: Great, thank you, Mike, I really appreciate that. That was helpful.

MS. STARKS: Maya, could you put up the motion again. **I think just add, move to initiate an addendum to consider implementing changes to the ARM Framework as recommended by the ARM Subcommittee and Peer Review Panel.**

MR. LUISI: Perfect, thank you.

CHAIR CIMINO: What we have is a clarification and a more perfected motion. That was with the seconder, Mr. Luisi, and thanks again, Mike, for helping craft that next step, and Maya and Caitlin for getting that up there for us. I guess once again, with all of this new crafting, is there a discussion on the motion?

MS. KERNS: I see no hands.

CHAIR CIMINO: Okay, great, let's call this for a vote then. With no additional discussion I'll just ask, is there any objection to the motion?

MS. KERNS: I see no hands in objection.

CHAIR CIMINO: Okay, thank you, Toni. Caitlin, again, if you can help me on Agenda. Are we through down to Other Business, or is there anything else you need?

MS. KERNS: Before Caitlin says anything, can you just clear.

CHAIR CIMINO: I know, let's clear the decks. That is a text you should keep on hand for me is clear the deck. Do you need me to read it as well, Toni?

MS. KERNS: It would be great to read it, since I think it might have changed, and then if you could just say that it carries.

CHAIR CIMINO: That sounds good, okay. Move to initiate an addendum to consider implementing changes to the ARM Framework as recommended by the ARM Subcommittee and Peer Review Panel**. The motion was made by Mr. Clark, seconded by Mr. Luisi, and the motion passed by consent.**

MS. STARKS: Thank you, Mr. Chair. I do believe we are to the end of our agenda items.

CHAIR CIMINO: Okay, thank you. Any other business to come before the Board, and if we don't see hands, Toni, I do have one last thing.

MS. KERNS: I see no additional hands.

ADJOURNMENT

CHAIR CIMINO: Okay, so my last bit to add to the agenda is just to say goodbye as Board Chair. I will be turning the Board over to John Clark, so the Board will be staying in the hands of Delaware Bay members. I can't thank staff enough. I can't thank the RSF Committee and the Technical Committee, for all the hard work that has gone into this. Thanks especially to Kristen and to Caitlin and to Mike Schmidtke, if he happens to be listening down there. It was really great working with all of you. Good luck, John.

(Whereupon the meeting adjourned at 11:40 a.m. on Wednesday, January 25, 2022.)

Atlantic States Marine Fisheries Commission

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MEMORANDUM

TO: **Horseshoe Crab Management Board**

FROM: **Horseshoe Crab Plan Development Team**

DATE: **April 13, 2022**

SUBJECT: **Recommendations for Horseshoe Crab Draft Addendum VIII**

Background

On April 7, 2022, the Plan Development Team (PDT) met to discuss development of Draft Addendum VIII to the Horseshoe Crab Fishery Management Plan (FMP). The Board initiated Draft Addendum VIII in January 2022 to consider use of the recent 2021 Revision of the Adaptive Resource Management (ARM) Framework[1] in setting annual specifications for horseshoe crabs of Delaware Bay-origin. Delaware Bay horseshoe crab management using the original ARM Framework was originally established under Addendum VII in 2012.

Following the recommendations of the independent peer review panel, which endorsed the ARM Revision as the best and most current scientific information for the management of horseshoe crabs in the Delaware Bay Region, the Board reviewed and accepted the ARM Revision in January 2022. The ARM Revision addresses previous peer review critiques, includes new sources of data, and adopts new modeling software to set harvest levels for Delaware Bay-origin horseshoe crabs that account for the forage needs of migratory shorebirds. Below is a summary of the PDT's discussion and recommendations on issues and options to include in Draft Addendum VIII.

Recommendations for Management Options to Consider Use of ARM Revision

The PDT discussed three potential issues for consideration in the Draft Addendum. First, the core issue to consider is whether to adopt the ARM Revision for setting harvest specifications for Delaware Bay-origin horseshoe crabs or not. The PDT recommends only two main options: Option A is status quo and Option B is management using the ARM Revision to set specifications. Additional options related to the ARM should be nested under Option B. The PDT notes that because the Addendum VII (2012) ARM Framework uses antiquated software that is no longer supported nor is it compatible with contemporary operating systems, status quo is no longer possible. To operate under "status quo" would mean reducing the ARM Framework to essentially a harvest control rule where harvest recommendations would be based on a look-up table of current horseshoe crab and red knot population numbers.

The PDT made the following recommendations related to ARM revision changes in the Draft Addendum. First, the PDT recommends language to redefine/clarify the short and long term management, update, and revision processes for the ARM Framework. The PDT recommended a three-level process as follows:

- Annual management process: This should remain as is, with the ARM Framework being used to produce harvest recommendations for the upcoming fishing year.

[1] A detailed overview of the ARM Revision can be found here. The full Revision and Peer Review Report can be found here.

- Interim update process: Every three years, an update process should occur in which the model parameters (e.g., red knot survival and recruitment, horseshoe crab stock-recruitment relationship) are updated based on the annual routine data collected in the region.
- Revision process: every 9 or 10 years (or sooner if desired by the Board), the ARM Framework should undergo a revision process similar to what occurred for the 2021 ARM Revision. This amount of time is appropriate given it allows for two updates to occur, and encompasses one generation for horseshoe crabs.

Second, regarding the harvest recommendations produced by the ARM Framework, the PDT recommends providing independent sex-specific harvest recommendations based on continuous harvest output of the model rounded down to the nearest 25 or 50 thousand male or female crabs.

- The discrete harvest packages recommended in Addendum VII are no longer appropriate. The original discrete harvest packages were established as a result of limitations of the previous software that was used to run the ARM model. The newer, more powerful software no longer has these limitations.
- The ARM Revision allows for optimal harvest recommendations to be made on a continuous scale, providing more precise recommendations for the optimal harvest. While the model can produce continuous harvest recommendations, the PDT expressed concerns that if those continuous harvest recommendations were made public, it would be possible to back-calculate the biomedical mortality input, which is confidential. Therefore, the PDT agreed it is necessary to round the continuous harvest output down to the nearest 25 or 50 thousand crabs to obscure the confidential biomedical data. This would mean an optimal harvest recommendation of 130,000 would be rounded to either 100,000 or 125,000. The level of rounding could be decided by the Board or a management option for public comment.
- The Revised ARM also provides sex-specific harvest recommendations that are independent of one another. Whereas male and female harvest levels were linked in the previous ARM due to software limitations, the PDT does not recommend maintaining the link between male and female harvest, as unlinked harvest by sex is a more precise output.
- Additionally, the PDT does not recommend changing the maximum harvest values (i.e., 500,000 males, 210,000 females) as those values were established through extensive stakeholder engagement and committee workshops during the development of the previous ARM Framework.

Third, the PDT recommends including the updated lambda values (proportion of total bait harvest that is assumed to be of Delaware Bay-origin) for New Jersey, Delaware, Maryland, and Virginia from the ARM Revision, but leaving all other aspects of the allocation model established in Addendum VII unchanged. This means Section 3a of Addendum VII would be updated, but Sections 3b, 3c, and 3d would remain status quo. Section 3e, which describes alternative methods for setting harvest specifications in the absence of required data sets, should be updated to include new data sets required to run the revised ARM model, but the methods for setting the next season's harvest should remain the same.

Lastly, the PDT recommended that language be included in the Addendum to allow some aspects of the ARM model to be updated via Board action rather than an Addendum process. The items the PDT recommended for adaptive management are the lambda values, which could be updated with new

genetic data, and the model parameters which could be reviewed during the three-year update process. These values and parameters are data-driven and are expected to change as more data are collected and updated through monitoring and research.

Additional Issues for Consideration in the Addendum

An additional item discussed by the PDT is the biomedical mortality threshold. Previously, the Board tasked the PDT with reviewing the threshold for biomedical mortality of 57,000 crabs that was established by the 1998 FMP. The FMP states that if the threshold is exceeded the Board would reevaluate potential restrictions on horseshoe crab harvest by the biomedical industry. The PDT tasked the Horseshoe Crab Technical Committee with reviewing the biomedical data, threshold, and best management practices for the biomedical collections, and providing advice to the PDT on potential management options to address this issue. The TC will meet on April 14, 2022 to discuss this task.

Proposed Draft Management Options

Based on the recommendations of the PDT described above, the following is a draft structure for management options that could be included in Draft Addendum VIII.

Issue 1: Adoption of the Revised ARM Framework for Setting Delaware Bay Harvest Specifications

Option 1: Status Quo

Under this option the current ARM Framework would be used for developing harvest recommendations for horseshoe crabs of Delaware Bay origin. As noted previously, the software used for the original ARM model is obsolete and it cannot be run on current computer operating systems. Thus, this status quo option would result in the following process for developing harvest recommendations: annual estimates of horseshoe crab abundance from the swept area estimates of the Virginia Tech Trawl survey will be decremented by half a year's worth of natural mortality. Red knot abundance will be estimated by the current mark-resight methodology. These values will be compared to a lookup table of optimal horseshoe crab harvest generated by the original ARM model.

Option 2: Management using the Revised ARM

Under this option, the Revised ARM Framework would be used to set the annual harvest specifications for horseshoe crabs of Delaware Bay origin. Changes to the ARM would encompass all aspects of the 2021 ARM Revision, including updated population dynamics models, software, reward function, lambda values, and ARM update and revision process. The weighting scheme for allocation of the Delaware Bay-origin harvest would remain status quo. The following sub-options would allow the Board to select the level of rounding of the optimal harvest recommendations.

- **Sub-option 2A: Round down continuous optimal harvest recommendation to nearest 25 thousand horseshoe crabs.** This option has the potential to result in higher harvest levels than option B.
- **Sub-option 2B: Round down continuous optimal harvest recommendation to nearest 50 thousand horseshoe crabs.** This option has the potential to result in lower harvest levels than option A.

Board Guidance for Development of Proposed Options

The PDT is seeking additional guidance from the Board related to the proposed management options that should be considered for public comment in Draft Addendum VIII. Specific questions are listed below:

- Does the Board want to consider options to modify the current model for allocating the optimized harvest output by the ARM Framework amongst the four Delaware Bay states?
- Does the Board request any additional options be considered in the Draft Addendum?
- Does the Board want to include management options to modify the FMP biomedical mortality threshold in Draft Addendum VIII?
- Is the Board interested in including any additional issues in the Draft Addendum?

Atlantic States Marine Fisheries Commission

Shad and River Herring Management Board

May 3, 2022
10:15 – 11:45 a.m.
Hybrid Meeting

Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary.

1. Welcome/Call to Order *(L. Fegley)* — 10:15 a.m.
2. Board Consent — 10:15 a.m.
   - Approval of Agenda
   - Approval of Proceedings from October 2021
3. Public Comment — 10:20 a.m.
4. Consider American Shad Habitat Plans/Updates *(B. Neilan)* **Action** — 10:30 a.m.
   - Connecticut River
   - Merrimack River
5. Consider American Shad and River Herring Sustainable Fishery Management Plan Updates *(B. Neilan)* **Action** — 10:45 a.m.
   - New York (River Herring)
   - Delaware River Basin Cooperative (American Shad)
6. Consider Technical Committee Report on Board Task on Prioritizing Systems for Shad Recovery and Developing Inventory of Available Data to Support Development of Fish Passage Criteria *(B. Neilan)* — 11:00 a.m.
7. Consider Fishery Management Plan Review and State Compliance for 2020 Fishing Year *(J. Boyle)* **Action** — 11:15 a.m.
8. Update on the 2023 River Herring Benchmark Stock Assessment — 11:30 a.m.
   - Discuss Stock Assessment Subcommittee Membership *(K. Drew)*
9. Review and Populate Advisory Panel Membership (*T. Berger)* **Action** — 11:40 a.m.
10. Other Business/Adjourn — 11:45 a.m.

The meeting will be held at The Westin Crystal City (1800 Richmond Highway, Arlington, VA; 703.486.1111) and via webinar; click here for details

Atlantic States Marine Fisheries Commission

MEETING OVERVIEW

Shad and River Herring Management Board
May 3, 2022
10:15 a.m. – 11:45 a.m.
Hybrid Meeting

Chair: Justin Davis (CT) Assumed Chairmanship: 2/21	Technical Committee Chair: Brian Neilan (NJ)	Law Enforcement Committee Representative: Warner (PA)
Vice Chair: Lynn Fegley (MD)	Advisory Panel Chair: Pam Lyons Gromen	Previous Board Meeting: October 19, 2021
Voting Members: ME, NH, MA, RI, CT, NY, NJ, PA, DE, MD, DC, PRFC, VA, NC, SC, GA, FL, NMFS, USFWS (19 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from October 19, 2021

3. Public Comment – At the beginning of the meeting public comment will be taken on items not on the agenda. Individuals that wish to speak at this time must sign-in at the beginning of the meeting. For agenda items that have already gone out for public hearing and/or have had a public comment period that has closed, the Board Chair may determine that additional public comment will not provide additional information. In this circumstance the Chair will not allow additional public comment on an issue. For agenda items that the public has not had a chance to provide input, the Board Chair may allow limited opportunity for comment. The Board Chair has the discretion to limit the number of speakers and/or the length of each comment.

4. Consider American Shad Habitat Plans/Updates (10:30-10:45 a.m.) Action

Background

- Amendment 3 to the Shad and River Herring FMP requires all states and jurisdictions to submit a habitat plan for American shad. A majority of the habitat plans were approved by the Board in February 2014, and it was anticipated that they would be updated every five years.
- An updated habitat plan for the Connecticut River and a new habitat plan for the Merrimack River were submitted for TC review and Board consideration at the May 2022 meeting (**Briefing Materials**).
- The Technical Committee reviewed the habitat plans and recommends Board approval (**Briefing Materials**).

Presentations

- Shad Habitat Plan Updates by B. Neilan

Board actions for consideration at this meeting

- Consider approval of updated shad habitat plans for the Connecticut and Merrimack Rivers

5. Consider American Shad and River Herring Sustainable Fishery Management Plan Updates (10:45-11: a.m.) Action

Background

- Amendments 2 and 3 to the Shad and River Herring FMP require all states and jurisdictions that have a commercial fishery to submit a sustainable fishing management plan (SFMP) for river herring and American shad, respectively. Plans are updated and reviewed by the Technical Committee every five years.
- Two updated SFMPs were submitted for TC review and Board consideration at the May 2022 meeting: New York River Herring SFMP, and Delaware River Coop SFMP (**Briefing Materials**).
- The Technical Committee reviewed these SFMP updates and recommends Board approval (**Briefing Materials**).

Presentations

- Shad and River Herring Sustainable Fishery Management Plan Updates for Board Consideration by B. Neilan

Board actions for consideration at this meeting

- Consider approval of updated SFMPs for NY (River Herring) and DE COOP (American Shad)

6. Consider Final Technical Committee Report on Prioritizing Systems for Shad Recovery and Developing Inventory of Available Data to Support Development of Fish Passage Criteria (11:00-11:15 a.m.)

Background

- In light of the 2020 American shad stock assessment results, which showed that barriers to fish migration are significantly limiting access to habitat for American shad, in May 2021 the TC recommended actions to address fish passage impacts on population recovery, including that dam removal and the use of fish passage performance criteria be prioritized by state and federal agencies with fish passage prescription authority. The Board sent letters to the U.S. Fish and Wildlife Service and NOAA Fisheries to support their efforts to review dam passage. Additionally, the Board tasked the TC with prioritizing systems for shad recovery and developing an inventory of available data that would support development of fish passage criteria.
- The TC identified Federal Energy Regulatory Commission (FERC) hydropower projects that are a priority for shad recovery efforts. Additionally, the TC gathered information on the types of data available for developing fish passage criteria for these priority projects.

Presentations

- Final Report on Prioritizing Systems for Shad Recovery and Developing Inventory of Available Data to Support Development of Fish Passage Criteria by B. Neilan

7. Consider Fishery Management Plan Review and State Compliance for the 2020 Fishing Year (11:15-11:30 a.m.) Action

Background

- State Compliance Reports were due on July 1, 2020
- The Plan Review Team reviewed each state report and compiled the annual FMP Review (**Briefing Materials**).

Presentations

- Overview of the FMP Review Report by J. Boyle

Board actions for consideration at this meeting

- Approve FMP Review for 2020 fishing year, state compliance reports, and *de minimis* requests

8. Progress Update on River Herring Benchmark Stock Assessment (11:30-11:45 a.m.)

Background

- The river herring benchmark stock assessment was initiated in April 2022. The data workshop is planned for July 2022, following the submission of 2022 compliance reports.

Presentations

- Update on River Herring Stock Assessment Progress by K. Drew

9. Other Business/Adjourn

Shad and River Herring 2022 TC Tasks

Activity level: Medium

Committee Overlap Score: Medium (Multi-species committees for this Board)

Committee Task List
• 2023 River Herring Benchmark Stock Assessment • Updates to state Shad Habitat Plans and River Herring SFMPs • Annual state compliance reports due July 1
TC Members: Mike Brown (ME), Mike Dionne (NH), Brad Chase (MA), Patrick McGee (RI), Jacque Benway Roberts (CT), Wes Eakin (Vice Chair, NY), Brian Neilan (Chair, NJ), Josh Tryninewski (PA), Johnny Moore (DE), Matthew Jargowsky (MD), Ellen Cosby (PRFC), Joseph Swann (DC), Eric Hilton (VA), Holly White (NC), Jeremy McCargo (NC), Bill Post (SC), Jim Page (GA), Reid Hyle (FL), Ken Sprankle (MA), Ruth Hass-Castro (NOAA), John Ellis (USFWS)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

SHAD AND RIVER HERRING MANAGEMENT BOARD

Webinar
October 19, 2021

These minutes are draft and subject to approval by Shad and River Herring Management Board.
The Board will review the minutes during its next meeting.

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INDEX OF MOTIONS

ATTENDANCE

Board Members

Megan Ware, ME, proxy for P. Keliher (AA)
Cheri Patterson, NH (AA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)
Mike Armstrong, MA, proxy for D. McKiernan (AA)
Raymond Kane, MA (GA)
Rep. Sarah Peake MA (LA)
Phil Edwards, RI, proxy for J. McNamee (AA)
David Borden, RI (GA)
Eric Reid, RI, proxy for Rep. Sosnowski (LA)
Justin Davis, CT (AA)
Bill Hyatt, CT (GA)
Sen. Craig Miner, CT (LA)
John Maniscalco, NY, proxy for J. Gilmore (AA)
Emerson Hasbrouck, NY (GA)
John McMurray, NY, proxy for Sen. Kaminsky (LA)
Heather Corbett, NJ, proxy for J. Cimino (AA)
Tom Fote, NJ (GA)
Adam Nowalsky, NJ, proxy for Asm. Houghtaling (LA)
Kris Kuhn, PA, proxy for T. Schaeffer (AA)
Loren Lustig, PA (GA)
G. Warren Elliott, PA (LA)
John Clark, DE (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Lynn Fegley, MD, proxy for B. Anderson (AA)
Allison Colden, MD, proxy for Del. Stein (LA)
Russell Dize, MD (GA)
Pat Geer, VA, proxy for S. Bowman (AA)
Shanna Madsen, VA, proxy for B. Plumlee (GA)
Chris Batsavage, NC, proxy for K. Rawls (AA)
Jerry Mannen, NC (GA)
Bill Post, SC, proxy for P. Maier (AA)
Malcolm Rhodes, SC (GA)
Sen. Ronnie Cromer, SC (LA)
Doug Haymans, GA (AA)
Spud Woodward, GA (GA)
Erika Burgess, FL, proxy for J. McCawley (AA)
Marty Gary, PRFC
Dan Ryan, DC, proxy for J. Seltzer
Lowell Whitney, USFWS
Max Appelman, NOAA

(AA = Administrative Appointee; GA = Governor Appointee; LA = Legislative Appointee)

Ex-Officio Members

Brian Neilan, Technical Committee Chair
Pam Lyons Gromen, Advisory Panel Chair

Staff

Bob Beal
Toni Kerns
Laura Leach
Lisa Carty
Maya Drzewicki
Tina Berger
Pat Campfield
Kristen Anstead
Emilie Franke
Lisa Havel
Chris Jacobs
Jeff Kipp
Savannah Lewis
Kirby Rootes-Murdy
Sarah Murray
Marisa Powell
Caitlin Starks
Deke Tompkins

Guests

Karen Abrams, NOAA
Pat Augustine, Coram, NY
Richard Balouskus, RI DEM
Meredith Bartron, US FWS
Alan Bianchi, NC DNR
Christopher Boelke, NOAA
Jason Boucher, NOAA
Rob Bourdon, US FWS
Delayne Brown, NH F&G
Jeff Brust, NJ DEP
Joe Cimino, NJ (AA)
Margaret Conroy, DE DFW
Jessica Daher, NJ DEP
Lennie Day
Mari-Beth DeLucia, TNC
Greg DiDomenico
Wes Eakin, NYS DEC
James Fletcher, Wanchese Fish

Guests (continued)

Alexa Galvan, VMRC
Lewis Gillingham, VMRC
Brendan Harrison, NJ DEP
Helen Takade-Heumacher
Jaclyn Higgins, TRCP
Kyle Hoffman, SC DNR
Miluska Olivera-Hyde, USGS
Stephen Jackson, US FWS
James Jewkes
David Kazyak, USGS
Greg Kenney, NYS DEC
David Sanderson-Kilchenstein, MD DNR
Rob LaFrance, Quinnipiac Univ
Wilson Laney
Chip Lynch, NOAA
Shanna Madsen, VMRC
Chris McDonough, SC DENR
Dan McKiernan, MA (AA)
Jason McNamee, RI (AA)
Steve Meyers
Mike Millard, US FWS
Chris Moore, CBF
Brandon Muffley, MAFMC
Kevin Milligan, USGS
Lindsey Nelson, NOAA
Tom O'Connell, USGS
Gerry O'Neill, Cape Seafoods
Derek Orner, NOAA
Alexis Park, MD DNR
Will Patten, NC DENR
Nicholas Popoff, US FWS
Will Poston, SGA
Kathy Rawls, NC (AA)
Harry Rickabaugh, MD DNR
Tara Scott, NOAA
Melissa Smith, ME DMR
Somers Smott, VMRC
Renee St. Amand, CT DEEP
Michael Stangl, DE DFW
Kevin Sullivan, NH FGD
John Sweka, US FWS
Brett Towler, US FWS
Troy Tuckey, VIMS
Beth Versak, MD DNR
Mike Waine, ASA
Jonathan Watson, NOAA
Meredith Whitten, NC DENR
Chris Wright, NOAA
Horace Wynn
Sarah York, NOAA
Erik Zlokovitz, MD DNR
Renee Zobel, NH F&G

The Shad and River Herring Management Board of the Atlantic States Marine Fisheries Commission convened via webinar; Tuesday October 19, 2021, and was called to order at 9:00 a.m. by Chair Justin Davis.

CALL TO ORDER

CHAIR JUSTIN DAVIS: Good morning, everybody. I'm going to call to order this meeting of the Shad and River Herring Management Board. My name is Justin Davis, I am the Administrative Commissioner from Connecticut, and am currently serving as the Chair of this Board.

APPROVAL OF AGENDA

CHAIR DAVIS: The first item on our agenda this morning is Approval of the Agenda. I'll ask if there are any suggested modifications or additions to today's agenda.

MS. TONI KERNS: I see no hands.

CHAIR DAVIS: Okay, great, we'll consider today's agenda approved by consent.

APPROVAL OF PROCEEDINGS

CHAIR DAVIS: Moving on, next item on the agenda is Approval of Proceedings from the May, 2021 Meeting, which were provided in the meeting materials. Are there any suggested corrections or additions to the meeting minutes from May, 2021?

MS. KERNS: I see no hands.

CHAIR DAVIS: Okay, great, we'll consider the proceedings from the May meeting approved by consent.

PUBLIC COMMENT

CHAIR DAVIS: All right, moving on to the next item on the agenda, Public Comment. At this time, I would be willing to entertain public comment on any issue not on the meeting agenda today. Toni, do we have any hands from the public?

MS. KERNS: Jim Fletcher indicated he wanted to speak, so Jim, go ahead and unmute yourself.

MR. JAMES FLETCHER: This is James Fletcher. You're talking about shad and river herring, and we are not talking about what the wastewater treatment cause PFAS. They are long lasting chemicals that show up in the water and affect everything; humans and fish. It's amazing that the Atlantic salmon was affected by this same type of chemical when they sprayed it for the spruce budworm. Is there any chance that the Shad and River Herring Management Board can have the habitat people specifically look at these chemicals?

Because as long as they are going into the water through the wastewater treatment system, trying to rebuild the shad and river herring is not going to work. A lot of these chemicals, depending on which type of chemical it is, affect the ability of the shad and river herring to osmose regulate, either when they're going to sea as young fish or when they're coming back to spawn. Is there any chance that the Shad and River Herring can specifically ask Habitat to look at these chemicals, and it's PFAS is what the wastewater treatment uses? I would ask that if we're going to try to do anything with shad and river herring, first we've got to find out what's affecting their ability to reproduce and get in and out of the fresh to brackish water. Thank you for your time.

CHAIR DAVIS: Thank you, Jim, for providing that perspective. Toni, do we have any other hands from the public?

MS. KERNS: I don't have any additional hands.

CONSIDER AMERICAN SHAD HABITAT PLANS AND UPDATES

CHAIR DAVIS: We'll move on to the next item on our agenda, which is a presentation from the Chair of our Technical Committee, Brian Neilan, concerning American Shad Habitat Plans and Updates.

MR. BRIAN NEILAN: Thank you, Mr. Chair, and good morning to the Board. My name is Brian Neilan, the

TC Rep from New Jersey and current TC Chair. Today I have for you three presentations to go over. I'm going to start with a review of recently submitted habitat plan updates from a few states since the last Board meeting.

Just a little background here. Under Amendment 3 all states and jurisdictions are required to submit habitat plans for American shad. They are meant to contain a summary of information on current and historical spawning and nursery habitat, threats to those habitats, and any habitat restoration programs currently are going on in the state or have in the past.

In February, 2020, the Board agreed that these plans should be updated every five years or so, similar to how we do our SFEs and ask the states to update existing plans, originally improved in 2014, and for the states with missing plans to submit their plans ASAP. Since then, the Board has approved 12 plans and updates from these states and river systems listed below.

Today we have another three we're going to review. Today we have three plan updates for Board consideration. Last month the TC reviewed the plans from the following jurisdictions, so Virginia, D.C. and from New York a plan for the Hudson River. After reviewing, the TC recommended that the Board approves all plans and updates.

We'll dive right in and start with the Virginia plan on the next slide. For the Virginia plan update, their plan covers the main tributaries to the Chesapeake Bay. In this case the James, York and Rappahannock Rivers. The 2021 habitat plan update information on existing threats identified in the previous report, and also identified some new additional threats.

Some highlights here from the plan update. The first additional threat was in river construction and blockage to migration. They felt that projects such as bridge and tunnel construction, maintenance, dredging, and other work in-water work have the potential for disruption of American shad migration, both from direct and indirect factors.

Some of these examples are acoustic interference or habitat alteration. They plan on addressing this threat through the enforcement of time of year restrictions on in-water development, and case-by-case consideration of appropriate mitigation measures for individual projects. Another threat they identified in this plan update was agriculture or industrial water intakes and discharges. Systems used by American shad are subject to significant withdrawals within this area that may have effect on spawning and nursery habitats. The recommended action in the plan to address this threat, was to include developing a better understanding of the amount of water intakes for agriculture, particularly in tidal streams and rivers that support American shad spawning and nursery grounds, and survey to better understand the effects of these threats.

Those are the updates for the Virginia plan. Go on to the D.C. plan. As I said, the D.C. plan was also, this is an update. It covers the portions of the Potomac and Anacostia Rivers, which fall within the borders of the District of Colombia. The updates from the previous plan include the completion of a dredging channelization project associated with the runway extension at Reagan National Airport.

There is also an update on an invasive species stomach content study. I believe they're mostly looking at invasive catfish species, so in this area blue and flathead catfish. This study is to better understand the effects of invasive predators, and what they may have on resident anadromous species.

They are still collecting samples. They mentioned they have at around a thousand stomachs at this point. They should have some good data for us on that soon. I think a lot of states are starting to see issues with invasives, especially these species of catfish. That is the D.C. habitat plan update. We can move on to the Hudson plan.

This was a new plan submitted by New York for the Hudson River. I'll go over this one a little more in

depth, since it's brand new. We could start with the habitat assessment. For the habitat assessment it was determined that American shad currently had access to 91 percent of historical mainstem Hudson River habitat.

This is from the mouth of the river up to the Troy Dam. They still have access to a good amount of habitat, but the conversion of habitat during the dredging and channelization of the upper portion of the estuary during the past century, has resulted in the loss of preferred habitat. New York did a pretty thorough threat assessment.

Here are some of the highlights from that threat assessment. They looked at impingement and entrainment as a major source of possible mortality. The water withdrawals may have had a significant impact on year class strength, but some reductions rated from 16 to 52 percent reduction in year class strength, as a result of impingement and entrainment mortality.

They looked at anthropogenic habitat changes, so dredging and channelization of the mainstem Hudson River, and adjacent land use changes have resulted in the change in degradation of preferred habitat used by American shad, especially for spawning and nursery habitat, including a loss of 57 percent of inner tidal shallow water habitat now north of the city of Hudson, so that's important nursery habitat there.

Then they also identified other threats, similar to what we're seeing up and down the coast, of course climate change issues and invasive species. New York has some habitat restoration programs happening, or have been completed in the recent past. Within the Hudson River there is significant and ongoing efforts to understand and reduce the impacts of threats to American shad and spawning nursery habitats. Just a quick rundown on some of the restoration plan highlights. This includes the removal of nine dams within the Hudson River estuary since 2016, opening up some important nursery habitat, including restoring vegetative shallow water and intertidal habitats.

They highlighted a side channel restoration projection completed in 2018 out at Gay's Point near Coxsackie New York, which I think was a bit of a pilot project for them, and I think went pretty well. They should be looking to do similar restoration projects in the near future. That's the rundown of the Hudson plan. We can go to the next slide, which is the next step today, so that would be consider approval of the three plans just presented. I could take any questions, or hand it over to the Chair to go forward with the next steps.

CHAIR DAVIS: Thanks, Brian. I'll ask the Board if anybody has any questions for Brian on the presentation to this point.

MS. KERNS: I see no hands, hold on, I have Pat Geer followed by Allison Colden.

MR. PAT GEER: I'm ready to make a motion if there are no questions.

CHAIR DAVIS: Was that Pat?

MR. GEER: Yes.

CHAIR DAVIS: Okay, Pat, I'll ask Allison really quickly if she has a comment or a question before we move to a motion.

MS. ALLISON COLDEN: I just had one quick question. Maybe it's good that Pat is on his mute button. My quick question for you was, I know Virginia is in the midst of working on a shad habitat restoration plan, so I was just wondering if any of that was reflected in here, or if that would be in the next round of updates. Was there anything that you all reviewed with respect to the restoration program in Virginia's plan?

MR. NEILAN: There were general updates. I don't have that info of the top of my head right now, but I know they updated not just a threat assessment, but their plans for the future. I think they will have more concrete answers in the following plan. I

think they're still in the planning process at this point.

MS. COLDEN: Okay, thank you.

CHAIR DAVIS: Brian, I just want to confirm. Are you done with your presentation on this section of the agenda, or was there another part of this presentation to come?

MR. NEILAN: No, this was it for the habitat plan.

CHAIR DAVIS: Okay, thanks, just wanted to confirm. Given that, Pat, I'll turn back to you if you're interested in making a motion.

MR. GEER: I move to approve the Shad Habitat Plans for Virginia, District of Colombia, and New York as presented today.

CHAIR DAVIS: Okay, thank you, Pat, do we have a second to the motion?

MS. KERNS: We have Malcolm Rhodes.

CHAIR DAVIS: Thank you, Dr. Rhodes. Any discussion on the motion?

MS. KERNS: No other hands.

CHAIR DAVIS: Given that, I'll ask if there is any objection to the motion.

MS. KERNS: I see no hands in objection.

CHAIR DAVIS: We'll consider this motion passed by unanimous consent.

CONSIDER TECHNICAL COMMITTEE REPORT ON METHODS FOR EVALUATING MIXED-STOCK CATCH

CHAIR DAVIS: All right, moving on to our next section of the agenda. Brian, you're back up again to give us a presentation on the Technical Committee report on methods for evaluating mixed-stock catch.

MR. NEILAN: As you said, next we have an update on the TCs task of developing methods to evaluate bycatch in mixed-stock fisheries in state waters. The task group and TC drafted a white paper on the results of this task and the work that was done, and that was included in the meeting material. It's an outline here, I'll be going over a little bit of background on the task.

The data reviewed by the task group, what methods were explored by the task group to evaluate this task, and then the TC recommendations for addressing mixed-stock fisheries, as a result of the methods that were evaluated. A quick rundown, some background here on the tasks. In August, 2020, after being presented with the results of the 2020 stock assessment, the Board tasked the TC with identifying potential paths forward to improve shad stock along the coast, in consideration of the assessment results.

Some system-specific TC recommendations were presented at the February, 2020 meeting, and also at this meeting the TC identified a need to understand and reduce impacts to external stocks of shad that were harvested in directed mixed stock fisheries. The Board then tasked the TC with the task we're about to go over here, so developing methods to evaluate bycatch removals in directed mixed-stock fisheries, in order to better understand and possibly reduce any of the impacts.

This presentation details the results of the work done for this task. To address this task, the working group developed a road map outlined to focus the scope of the task and guide discussion. We defined goals and expectations, we identified known or potential mixed-stock fisheries, we collected available data that might be relevant to understanding or identifying mixed-stock fisheries, determined the feasibility of developing modeling methods to estimate composition of mixed-stock fisheries, and we evaluated novel or existing methods of reducing or eliminating any of the effects of mixed-stock fisheries. Where we finished up and where we are today is, we've developed recommendations for the Board on eliminating mixed-stock fisheries or recommending research priorities going forward, to address this task.

During our data assessment, the task group collected datasets from up and down the coast that could be useful for identifying and quantifying mixed-stock fisheries. From the data we received, using the tagging studies and genetic analysis, this provided useful information for identifying mixed-stock fisheries in the Delaware Bay and the Winyah Bay.

For this task the Delaware Bay was evaluated given the quantity and quality of data available from this system. We had commercial landings from New Jersey and Delaware we looked at back to 1988 to the present. We had some tagging studies from back in the '90s to the present from New Jersey. A few different DNA analysis studies for identifying stock composition and stock assignment.

Then long-term general abundance surveys, including ones from out of basin stocks. Specifically, we looked at New York. The working group took a tiered approach to evaluating the data and methods available. Three tiers were developed based on the following criteria, quantity and quality of data currently available, so Tier 1 was what sort of analysis we could do right now, given the data we currently have available.

Second tier was data that could be reasonably collected without significant changes in our near-term effort, so essentially what could help improve analysis with a minimal to moderate increase in effort. Then our third tier were the ideal collection efforts that would provide information necessary to support more robust modeling efforts, such as for example a statistical catch at age model.

The first tier, which was analysis we could do right now, given the available data. The task group explored developing a relative F with the static genetic proportions based on historical tagging data. Relative F is simply calculated by taking harvest and comparing it to some fishery independent abundance index. This would limit relative F to a level established post hoc, and any management triggers would have a non-biological rationale.

In the case of the Delaware system, a static percent of total catch was assigned to the Hudson stock based on tagging surveys. We looked at total catch in the Hudson. We looked at our tagging studies that showed, depending on the year X amount of Hudson stock made up part of the total harvest. That was compared to an adult abundance index from the Hudson River, and the resulting value represents the Hudson stock-specific relative F.

From here an average relative F for the time series can be generated, and then obviously from there you could consider developing benchmarks and triggers based on this time series when harvest levels were deemed to be appropriate. That was the first tier, as I said, what we could do right now, given the available data. For a second tier, the task group explored the viability of a relative F with a time-varying stock composition. Again, this is relative F, so it's the same general method as the previous tier, but would require regular genetic sampling or tagging studies to better inform the yearly out of basin composition within the mixed stock fisheries. You can get a year-on-year percentage of assignment, versus the previous method, which relies on an average composition over the entire tagging survey time series, or you could use the small single year snapshot genetic analysis data that we have.

This will require more consistent sampling, and would allow for year-on-year specific stock composition assignment of catch would benefit that. Yearly assignment likely fluctuates on a yearly basis, so this would account for that. Finally, our third tier. This represents the ideal methods for evaluating mixed stock harvest and its effects on out of basin stocks.

Some of the methods explored were in bycatch impact analysis for a statistical catch at age model. These methods would require a significant increase in both fishery independent and fishery dependent sampling efforts, as they have a much higher data needs to be able to complete the models.

While the third-tier methods would provide the most robust analysis of mixed stock fishery impacts, the required increase in data collection and sampling efforts cannot practically be completed by the agencies involved, without a significant increase in both staff time and the resources. Here we have the TC recommendations based on the work done by the task group. After reviewing the different tiers, the TC recommends that the second-tier method be used for evaluating bycatch removals in directed mixed stock fisheries.

A reminder, this tier involves developing a relative F index based on increased genetic sampling or tagging efforts, which can provide annual stock composition of mixed stock landings. This method was preferable to the current first tier methods of applying a historical average to the stock assignment, based on tagging and DNA studies we have available as regular DNA analysis can account for yearly fluctuations in stock composition.

The states with mixed stock fisheries would develop management strategies based on these methods to reduce impacts of out of basin harvest in mixed stock fisheries. These strategies should be incorporated to current SFPs when developed. That's the TC recommendations. We're here at next steps, and obviously I can take any questions that the Board may have.

CHAIR DAVIS: Thank you, Brian for that presentation, and I'll thank the Technical Committee for the excellent work. I'll open the floor. Are there any questions for Brian?

MS. KERNS: We have John Clark followed by Lynn Fegley.

CHAIR DAVIS: Go ahead, John. Toni, is it just me or are we not hearing John?

MS. KERNS: I thought it was me. I'm not hearing John. All right, John, go ahead.

MR. JOHN CLARK: Thank you for the presentation, Brian, I was just wondering if you could briefly describe what the increase in cost would be from going from Tier 1 to Tier 2. Obviously, as you mentioned with Tier 3, it's a cost benefit we're looking at with some of these methods, and I'm just wondering what we would be looking at, in terms of increased resources if we go to Tier 2. Thanks.

MR. NEILAN: Sure, no problem. I can give you a general idea of what we looked at, at least in New Jersey, being one of the basin states this would affect us as well. Tier 1 is potentially how we operate right now, so there would be no increase in cost. Tier 2 would require regular genetic sampling of the commercial fishery, either you could have onboard observers or you could do dockside sampling.

Obviously, the onboard observers are going to add to the cost. In terms of dockside sampling, typically a little easier, especially coordinating with the fishermen, days at sea versus just meeting them at the dock. We were looking approximately if you got $100.00 a sample for DNA, and that was with the USGS lab, and they were looking at around that.

I believe we were looking at 500 samples a year, and it was going to be around $100.00 a sample for analysis and report each year, around $50,000.00. It is an increase in sampling. The TC felt that the increase, the juice was worth the squeeze here, in terms of getting that year-on-year stock assignment versus the tagging study, which was being used for the first tier.

MR. CLARK: If I could just follow up for a second, Brian. I understand that, I mean it's not a huge cost, but just judging by the Delaware Bay shad fishery, this is not a huge fishery. It seems like it's getting smaller. I don't know about the Jersey side, but it's getting harder to find even anybody in Delaware that can bone a shad. It doesn't seem like there is a huge need for me to be knowing what the mixed stock composition is on an annual basis. But as I said, just kind of wondering based on the current state of the fishery.

MR. NEILAN: Yes, I think we're seeing a similar on our side of the Bay. It is a fishery that is slowly, basically teetering out through attrition. I think the Bay harvest on our side is 10 to 20,000 pounds a year. Total Bay harvest is probably close to 40,000 pounds a year.

That being said, probably about 10,000 pounds a year assigned to the New York stock for both sides of the Bay. The TC felt that the analysis, it was beneficial to have the year-on-year sampling studies, to assign year specific assignment, just because it likely fluctuates over the years. That is the general consensus of the TC.

CHAIR DAVIS: Okay, Lynn.

MS. LYNN FEGLEY: Yes, thanks for the presentation, Brian. I think you answered by question when you were answering John's question. I was just curious who was doing the genetic analysis, where the samples were going. It's going to USGS.

MR. NEILAN: Yes, the previous studies we just, the Delaware Basin states just finished one from the US Fish and Wildlife Service, the Northeast Fisheries Science Center did a three-year study for us. The one I was looking at going forward, I was applying for some funding. USGS, they're handling the coastwide alosine repositories for DNA, and they are definitely interested in doing this DNA analysis.
MS. FEGLEY: Great, thank you.

MS. KERNS: Justin, you now have John Maniscalco followed by Roy Miller.

CHAIR DAVIS: John, you're up.

MR. JOHN MANISCALCO: First, I would like to thank the TC for doing the work on these evaluation methods. I had a lot of reservations about their first-tier approach, using that constant value. I recognize that there are costs associated with annual or even semiannual genetic sampling. But I'll just remind the Board that whereas New Jersey and Delaware have commercial and recreational fisheries on that system, anglers and commercial fishermen on the Hudson River are prohibited from taking shad, even in that catch and release kind of fishery.

There was the 4,000, 5,000, 10,000 pounds that are removed from the Delaware that are Hudson River fish, flies in the face of the prohibitions we're putting on our own fishermen. I would certainly support the Tier 2 recommendation, and I would be interested in having conversations about how we could find money to support that genetic sampling, and the observer work.

CHAIR DAVIS: Roy.

MR. ROY W. MILLER: Very quickly, Brian, you didn't mention a geographic component to the genetic sampling. Specifically, I'm referring to within the Delaware Bay system. Previous work has shown you're more likely to encounter out of basin shad in the lower portion of Delaware Bay (breaking up) for the upper portion of Delaware Bay with a lower Delaware River. I assume there would be a geographic component to that sampling. Would the emphasis be on the lower Bay fishery, such as it is, even though as already discussed it's much reduced what we'll get in 20 years?

MR. NEILAN: Sure, so I think the best way to go about it would be to target the whole fishery. We have fishermen who land both in the Delaware in the lower Bay and the upper Bay. The previous genetic sampling study we did took samples from potentially the mouth of the Bay all the way up to close to New York.

For the mixed stock fisheries purposes, we would be looking at the entire Bay as a whole. The Bay is where the fishery is being executed. Just to the mouth of the river, where it opens up into the Bay all the way down to Cape May. We would like to cover the entire fishery (faded) and kind of get a general idea of the fishery as a whole, not just the lower Bay.

The genetic sampling showed that we certainly saw out of basin harvest in the upper Bay as well. It kind of tiers as you go up the Bay into the river,

obviously. The further up you go the more Delaware River fish you'll be seeing, but you will also see out of basin fish in the upper Bay as well. There is a fishery that goes on up there, so we would evaluate that as well.

CHAIR DAVIS: Do we have any more hands, Toni?

MS. KERNS: That's all our hands.

CHAIR DAVIS. Okay, so I think at this point the Board has a decision point here. I think the Board could entertain a motion to adopt the TC recommendation and recommend that the Delaware River Basin Coop Sustainable Fishery Management Plan incorporate the recommended methods.

But I thought, you know, perhaps it might be helpful before the Board decides whether or not it wants to move forward with a motion at this time, to get perspective from some of the affected jurisdictions here on whether they sort of feel comfortable at this point with the TCs recommendation.

Moving forward with incorporating that into the Sustainable Fishery Management Plan or perhaps there might be a desire for some more discussion or further digestion of the TCs report. Not to put those jurisdictions on the spot, but I think it might be helpful to get that perspective, before the Board considers what to do here.

MS. KERNS: We have John Clark and then followed by Roy Miller.

CHAIR DAVIS: Okay, John Clark.

MR. CLARK: I certainly understand the request, the making the recommendation to do this. As I said, I'm just, and I was glad to hear from John Maniscalco about the New York perspective on this. I understand that our fisheries, both commercial and recreational in the Delaware are catching Hudson shad also.

It's just one of those things where, as Brian pointed out, just the effort they're doing in New Jersey to do this on an annual basis, getting the genetic work done that's $50,000.00 that obviously there is an opportunity cost for whatever we do with shad. I'm just thinking, for example just within Delaware.

We're in the process of trying to eliminate blockages on Brandywine Creek, which is a tributary of the Delaware that in the past was heavily used by shad and river herring. You know I understand from the TC perspective that this is worth the effort, but I would just like a little more time, I think.

I understand if a motion is made it will be a recommendation that the Delaware River Basin Coop would not be required to incorporate Tier 2 methods. As I said, if we get to that point fine, but I just think at this point it might behoove us to wait a little bit on this, until we can more thoroughly analyze what would be the best things to do with shad on the Delaware.

CHAIR DAVIS: Roy Miller.

MR. MILLER: I would like to chime in with John on this. I just want to make sure that, to coin a phrase, the juice is worth the squeeze, in this particular case. I am very enthused over restoration of shad in the Brandywine System, which is a major lower tributary to the Delaware River, for those not familiar with the Basin. Money spent on that restoration, I think, is already starting to show return and payoffs. I would be hesitant to save a few thousand fish that might otherwise be bound for the Hudson System, and ignore local restoration efforts for the sake of that effort. Thank you for the opportunity of giving my opinion.

CHAIR DAVIS: Toni, do we have any other hands?

MS. KERNS: We have John Maniscalco.

CHAIR DAVIS: Okay, go ahead, John.

MR. MANISCALCO: Again, I understand the costs. In New York state we are doing coastwide genetic work to better evaluate where Hudson River fish are being caught in fisheries coastwide. We are

doing habitat restoration work. We are investigating other potential causes within the river itself, to determine what is inhibiting the recovery of our shad stocks. But certainly, the loss of thousands of adults to Delaware Bay fisheries could certainly be an issue.

If we need to further develop these ideas and how they are going to be implemented, I'm certainly willing to consider that. But I do not want to see evaluation of mixed stock fisheries fall off the table, and I don't want to see the possibility of this being included in future sustainable fishery management plans be removed. Because as I said before, where there are fisheries allowed in the Delaware Bay, those fisheries are not allowed on the Hudson River, even though there is a direct impact of the Delaware Bay fisheries on Hudson River fish.

CHAIR DAVIS: Do we have any other hands, Toni?
MS. KERNS: I don't have any other hands.

CHAIR DAVIS: Okay, thanks, Toni. After hearing those perspectives from Delaware and New York, I think it's fair to say that there is a recognition of the value of this work of continuing to pursue this line, and potentially incorporate it into the sustainable fishery management plan at some point.

Also, some concerns about potential cost of the work. Opportunity costs something, I'm sure all of us who work in the Agency environment are familiar with. Given those perspectives, I guess at this point I'll turn it back to the Board and ask if anybody would like to make a motion at this time, relative to the TC recommendations.

MS. KERNS: I have John Maniscalco.

CHAIR DAVIS: Okay, go ahead, John.

MR. MANISCALCO: I would like to make a motion for the Board to approve the TC recommendation to incorporate a mixed-stock fishery evaluation to the Delaware River Basin Cooperative Sustainable Fishery Management Plan.

CHAIR DAVIS: We have a motion on the board made by John Maniscalco. Do we have a second to the motion?

MS. KERNS: Allison Colden.

CHAIR DAVIS: Allison, just to confirm, you're seconding the motion?

MS. COLDEN: Yes, that's correct.

CHAIR DAVIS: Okay, great, so we have a motion with a second. At this time, I'll ask John, would you like to speak to the motion?

MR. MANISCALCO: I mean I think I've said my piece already. I'm certainly willing to see this concept further developed. But as I said before, I don't want to see it forgotten, thanks.

CHAIR DAVIS: Okay, thanks, John. Any further discussion on the motion? Toni, do we have any hands?

MS. KERNS: John Clark.

CHAIR DAVIS: Okay, John Clark, go ahead.

MR. CLARK: Again, I'm not opposed to doing more sampling and I understand this is a recommendation. I just thought at this point that, you know again, I know the Delaware River Basin Coop is going to meet to discuss the Sustainable Fishery Management Plan, I believe it's next week.

This could very well be part of it. I just didn't think at this point, as I said, I think this is a little premature, and just to analyze more all the factors involved here. I know it's tawdry to have to consider funding in all these times, but there is truly cost as to where we get the most bang for our buck with what we spend on the shad and river herring.

CHAIR DAVIS: Toni, do we have any more hands?

MS. KERNS: No additional hands.

CHAIR DAVIS: Okay, given that I'll all the question. At this time, I'll ask everyone in favor of the motion to raise your hand.

MR. CLARK: Can we have a minute to caucus, Mr. Chair?

CHAIR DAVIS: Yes, I apologize. We'll give two minutes for a caucus, thank you. That was two minutes for a caucus, I'll ask if any states or jurisdictions feel like they need more time to caucus, please raise your hand.

MS. KERNS: I don't see any hands. Sometimes I think it might be easier for them just to call out if they need more time, if they are caucusing via their computers.

CHAIR DAVIS: Okay, thanks, Toni. Not hearing any calls for additional time, we'll go ahead and call the question here. I'll ask all states and jurisdictions in favor to raise their hands.

MS. KERNS: It looks like the hands have settled, all right, I will call out the states and jurisdictions in favor. Georgia, U.S. Fish and Wildlife Service, New Hampshire, Maine, Pennsylvania, Florida, NOAA Fisheries, New York, District of Colombia, North Carolina, Maryland, New Jersey, Massachusetts, South Carolina, and Potomac River Fisheries Commission. Did I miss any? Rhode Island, thank you, and Connecticut. I'm going to put the hands down for everybody.

CHAIR DAVIS: Okay, all those opposed, please raise your hand.

MS. KERNS: We have Delaware and Virginia.

CHAIR DAVIS: Thanks, any abstentions?

MS. KERNS: I have no abstentions.

CHAIR DAVIS: Any null votes?

MS. KERNS: No null votes.

CHAIR DAVIS: Okay, thanks, I believe the motion carries, although I don't have the count, Toni, do you have that?

MS. KERNS: Caitlin should have the count.

MS. CAITLIN STARKS: Sorry, I was just double counting, I believe I have 16 in favor, 2 opposed.

MS. KERNS: Mr. Chair, Roy Miller has his hand up.

CHAIR DAVIS: Okay, Roy Miller.

MR. MILLER: Very quickly. I'm wondering if through the Delaware River Cooperative, perhaps New York might be able to assist the lower basin states in helping fund these studies, after all it is their shad, they are concerned about. If they are able to help financially or materially, in terms of analysis or something like that with that effort. I think that would be a good faith gesture, and would be much appreciated.

MS. KERNS: We now also have John Maniscalco.

CHAIR DAVIS: Okay, go ahead, John.

MR. MANISCALCO: Roy, I certainly can't commit to anything, but you're right it is Hudson River shad that are being taken. I hope we have some fruitful conversations at the next Coop meeting about how we could get this kind of work funded.

CHAIR DAVIS: Thanks, John, do we have any other hands up at this time, Toni?

MS. KERNS: No additional hands.

PROGRESS REPORT ON PRIORITIZING SYSTEMS FOR SHAD RECOVERY AND DEVELOPING INVENTORY OF AVAILABLE DATA TO SUPPORT DEVELOPMENT OF FISH PASSAGE CRITERIA

CHAIR DAVIS: Okay, given that, I'm going to go ahead and move us on to the next item on our agenda. I think Brian will be giving us another presentation, a Progress Report on Prioritizing Systems for Shad Recovery, and Developing the

Inventory of Available Data to Support Development of Fish Passage. Brian, it's all yours.

MR. NEILAN: You guys are going to hear from me one last time here. For our last presentation I'm going to be going over the TCs progress on its shad passage prioritization task. Just a quick outline of what I'm going to go over here, just some background, some progress on the task, what the TC has done so far. Then next steps looking forward.

In August of 2020 the Board tasked the TC with identifying potential paths forward to improve shad stocks along the coast, considering the assessment results. Obviously improving shad passage directly gets to the heart of this task. In May of 2021, the Board followed a TC recommendation that the Commission send letters to agencies with relevant authorities to request prioritization of these actions when considering licensing permitting of projects that may impede access to the spawning grounds and out-migration.

The TC was tasked with prioritizing systems for shad recovery and developing an inventory of available data that would support the development of fish passage criteria. The Commission sent a letter in June of 2021 to the Fish and Wildlife Service supporting the Services efforts to require fish passage during relicensing of hydro powered projects, and ensure that performance standards of fishery related license conditions are met.

The Service responded favorably in August, and just looking forward to seeing what the TC would come up with, in terms of prioritizing different projects, based on need. For our progress on this task, the TC was tasked with prioritizing systems for shad recovery, and developing an inventory of available data to support the development of fish passage criteria.

The fish passage task group required a table of the expected FERC relicensing projects along the Atlantic coast coming up for either relicensing or applying for a first-time license. Expected between FY2020 and 2030, this list represented 150 plus projects. The TC members from each state were asked to decide whether a project in their state was a priority, based on the following criteria.

Does this system have an existing recovery plan? Does this system have existing performance standards? Does this system have upstream passage? Does it have downstream passage? Is alosine passage needed here? Is this system a state priority in general? That was what was considered when we looked at sort of whittling down the number of projects who are priority projects and systems. Continuing with our progress on the task here. From the 150 total projects initial list, we have narrowed down to 36 priority systems along the Atlantic coast. This is based on the TC members from each state reviewing the criteria I mentioned in the previous slide for each project. The TC is continuing to review the list of priority systems, and providing information on available data that could be used to support passage criteria.

That is currently where we're at, and I'm still narrowing down some of the systems. They haven't all been reviewed yet. Where we are right now, the TC will finalize our list of priority projects and the inventory of available data, and provide it to the Board for review at the next meeting, in terms of the final report, hopefully to be used for prioritizing systems with upcoming FERC relicensing to have fish passage requirements as part of their licensing requirements. That is where the TC is at with this task right now. I could take any questions anybody has.

CHAIR DAVIS: Okay, thanks, Brian. I'll thank Commission staff for their efforts in getting those letters out earlier this year, and thank Brian and the TC. We've certainly been keeping them busy lately with a variety of tasks, and we certainly appreciate all their efforts. I'll open it up to the floor. Are there any questions for Brian?

MS. TINA L. BERGER: Max Appelman has raised his hand.

CHAIR DAVIS: Okay, Max, go ahead.

MR. MAX APPELMAN: Thank you, Mr. Chair, and thank you Brian, and another thank you to the TC for working on this. You know NOAA Fisheries, we still think that the TC is in a unique position to look at the coast, you know holistically, and work towards identifying priority systems and projects.

One of the, I guess this is really just a comment. One of the concerns that I've been hearing from some of the folks that work closely with at the Agency is the concern about different states using different approaches to prioritizing systems within their state, and projects within their state. I saw that as a criterion for prioritizing, you know relicensing efforts that are coming down the pike.

I just wanted to sort of flag that that I'm hearing consistency is really important. I think that was part of where we thought the TC could come in and really step back and think of what's a consistent way to approach prioritization on a coastwide scale. Something to keep in mind as you guys continue to work on this task, and we look forward to the final report coming at the next meeting.

CHAIR DAVIS: Okay, thank you, Max. Any additional hands, Toni?

MS. BERGER: Lowell Whitney.

MR. LOWELL WHITNEY: Great, thank you, Mr. Chair. On behalf of Fish and Wildlife Service, I really appreciate the work the TC is doing in this regard. I just want to second the statement Max just made about the need to really understand the criteria that was used for the prioritization. I'm looking forward to seeing that in the final report. Also, in looking at the presentation, I do believe that NOAA received a letter as well. Again, thanks to the TC for the work on this, and we're looking forward to seeing the results.

CHAIR DAVIS: Great, thank you for that, Lowell, and certainly NOAA did receive a letter as well, so that might have been a slight oversight in the presentation. Toni, any additional hands?

MS. BERGER: No.

ELECT OF VICE-CHAIR

CHAIR DAVIS: Okay, given that, we will move on to our last item on the agenda today, which is to elect a Vice-Chair of this Board, and at this time I'm going to turn to my fellow Connecticut Commissioner Bill Hyatt, who I think will be making a motion along those lines. Bill.

MR. BILL HYATT: Sure, Mr. Chair. I move to nominate Lynn Fegley for Vice-Chair of the Shad and River Herring Management Board.

CHAIR DAVIS: Great, thank you, Bill, do we have a second to the motion?

MS. BERGER: Both John Clark and Mike Armstrong have their hands up.

CHAIR DAVIS: All right, out of deference to my Board share predecessor, I'll give the second to Mike Armstrong. I'll ask if there is any discussion on the motion. **Hearing none, any opposition to the motion?**

MS. BERGER: No hands have been raised.

CHAIR DAVIS: Great, thank you. **Thanks, and congratulations, Lynn!**

MS. STARKS: Mr. Chair, I believe we had one more presentation from Tom O'Connell.

CHAIR DAVIS: Ooh, that's right, I think I'm operating off an outdated version of the agenda. Thanks, Caitlin. Okay, so at this point I'll go ahead and ask Tom to give his presentation.

UPDATE FROM USGS EASTER ECOLOGICAL SCIENCE CENTER ON ALOSINE SCIENCE IN SUPPORT OF INTERSTATE MANAGEMENT

MR. TOM O'CONNELL: Well, it's a pleasure to get invited and to see a lot of familiar names on the attendee list, and hear some familiar voices,

because it's been a little while. I really appreciate the opportunity to highlight some of the Alosine research that USGS is involved in at the Eastern Ecological Science Center.

Just for those of you that are not familiar with myself. Again, it's Tom O'Connell, and I'm the Center Director for the USGS Eastern Ecological Science Center. Many of you might be familiar with me with my time for the Maryland Department of Natural Resources Fishery Service, where I spent most of my career, including time as the State's Fisheries Director, and it's a pleasure to come back here today and join all of you.

For those of you that may be less familiar with USGS, you may be asking why is U.S. Geological Survey involved in ASMFC fishery science. It kind of goes back to a reorganization of DOI back in 1993, where there was an interest of the department to separate science from management, and a lot of the scientists across the DOI bureaus were moved over to USGS. As a result of that, you know USGS is the only non-regulatory science agency within the Department of Interior, which uniquely positions USGS to deliver ASMFC actional science, as required by the Atlantic Coastal Fisheries Cooperative Management Act of 1993, which states that the Secretary of Commerce and DOI shall implement a science program to support ASMFC.

In 2020 the Eastern Ecological Science Center was formed out of a result of a merger between two other science centers, so Leetown Science Center, which is mostly a fish and aquatic science center, and the Patuxent Wildlife Research Center, which is more of a terrestrial wildlife science center. I've been asked to serve as a center director for the new Eastern Ecological Science Center, and you can see what our vision and goals are going forward.

But ultimately it comes down to, I'm really trying to establish a culture amongst our scientists, where we have a strong engagement with partners like the Atlantic States Marine Fisheries Commission, and we're aligning our limited, appropriated budgets to the highest priorities of our partner needs, and hopefully be viewed as a go-to organization to support science needs.

We are located in the Eastern U.S. We have three main laboratories in West Virginia, Maryland and Massachusetts, as well as eight field locations where we have scientists co-located at universities or other science centers. EESC is well positioned to be the lead science center amongst USGS to support the science needs of ASMFC.

About three years ago in an effort to try to strengthen USGS partnerships, I initiated communications with USGS leadership, and obtained support for strengthening USGS science support to ASMFC, and the USGS ecosystem mission area that provides funding to our center agreed to provide $100,000.00 in each of the past three years to allow us to increase our science support to ASMFC.

Through a lot of partnerships with agencies like NOAA, National Marine Fisheries Service, U.S. Fish and Wildlife Service, states and other parts of USGS, we've been able to leverage that initial investment to support over 20 research projects that are now totaling about 2 million dollars.

I just want to make a very important point that our involvement is not meant to be competitive with other federal or state agencies, we are really viewing this as a complementary science support role. We work very closely with NOAA and Fish and Wildlife Service and other states. To make these investments as beneficial as possible, we have coordinated closely with Pat Campfield as Science Director.

Where our scientists look at your five-year science priorities document, develop ideas, and we run those through Pat and Technical Committee representatives, and get feedback on which projects would have the greatest impact to ASMFC, and those are the ones that we've been focusing in on. Another way that we're looking to provide support to ASMFC is increasing our participation on the

Science and Technical Committees, here is a number of them that USGS has representatives, not just at Eastern Ecological Science Center, but other cooperative research units that fall under USGS responsibility and other science centers. Through this increased partnership, it's been recognized that it would be valuable to establish a new memorandum of understanding between NOAA, Fish and Wildlife and ASMFC to formalize USGS Science support role.

That is going to help me solidify longer term funding, and hopefully increased funding support over time. That's a little bit about why USGS is involved, and what I wanted to do is just highlight some of the research projects that are underway at the Eastern Ecological Science Center that pertain to Alosines.

These are ten projects that are listed here. Several of them are very relevant to your discussions today. The projects range from population structure and dynamics to fish help to aquatic ecosystem, habitats, and including but not limited to fish passage design and testing, which was talked about in the Technical Committee, just the past agenda item.

I'm not going to highlight all ten of these projects, but I did want to highlight a couple of them in more detail. This first project is the Alosine genetic stock identification and tissue repository, led by Dr. Dave Kazyak, who is our Center's lead geneticist in the Dr. Tim King Genetics Lab. I'm sure many of you may have known Tim King over the years.

Dave and his team are using genetic markers to build baseline information for American shad, blueback herring and alewife. The use of single nucleotide polymorphisms will provide enhanced resolution of stock structure, greater repeatability, and cost savings when compared to previous genetic analysis using microsatellite markers.

I know there were previous conversations in regards to the funding of this work, which was approved in the TC recommendation. This is an area where USGS I think, can really prove beneficial to ASMFC. We're mostly an appropriated funded science center, and I will do my best if this remains a priority of ASMFC, to provide the funds to help support the genetic analysis.

If not fully depending on the scale of effort, we will try to at least minimize the additional cost that would be needed to support this work. Our scientists are seeking collaborators to assist with sample collection, and if any of you have individuals that are able to collect tissue samples, there is contact information here to contact, and we can provide the information needed to receive the samples, and make them part of the genetic tissue repository.

The other area I want to highlight relates to fish passage. Our Center's Conte Anadromous Research Fish Laboratory in Turner Falls, Massachusetts, has a very unique fish passage research facility located along the Connecticut River, where we have biologists, hydraulic and civil engineers working together to design and test fish passageways tailored to specific species and river systems.

These scientists, some of you may know include Alex Haro, Ted Castro-Santos, Kevin Mulligan, and Brett Towler, who has been with Fish and Wildlife Service but now working with Eastern Ecological and others. What is unique is we're able to utilize a multiscale flume testing laboratory, where scientists are able to test initial ideas at a smaller scale, until they obtain the desired performance requirements, tailored to a particular species of fish. Then as they get close to that they can build it down into a larger prototype, and put it into one of our larger flume systems, where we're able to introduce fish of interest, and be able to monitor their performance related to these designs through an advanced telemetry system that we have in the flume system.

These multi-disciplinary team of scientists are improving fishway designs. They are looking to increase the percentage of alosines that are able to find the passage, reduce the amount of time it takes for a fish to pass the ladder, and increase survival of upstream and downstream migration. This information may be pertinent to some of the

performance criteria that is currently being discussed.

One project that our scientists are involved in is focused on reducing the time, and increase the proportion of fish that are passing a fishway once they enter it. This begins with looking at the fish entranceways, and this project we're looking at reducing the amount of time for fish that are approaching a fishway entrance to find it.

Increase the attraction and the proportion of fish entering it, and ultimately help increase the survival of upstream migration. Another part of our science focus on fish passage is looking at what happens when the fish actually gets into the fish ladder. This project is looking at a Novel D-cylinder design to try to improve, reduce the amount of time and increase the proportion of fish that once they enter the ladder can actually get through, and be at a health level that they can continue upstream and spawn successfully.

As many of you probably know, many historic Atlantic Coast fish ladders were designed based upon technologies developed for Pacific salmonids, which have very different swimming capabilities than the fish we're targeting on the Atlantic Coast. By having scientists that can understand the swimming behavior of these species of fish.

Then working together with our hydraulic and civil engineers, we can look at designs that are more tailored to the Atlantic species of interest like shad and herring. Then the last project I wanted to emphasizes. This project focuses on fish habitat assessments, and as many of you know, one of the biggest drivers to our Atlantic Coastal Fisheries is what's happening on the landscape.

Many of the times it's outside of our management regulatory control. This project is a project that we're working closely with NOAA, National Marine Fisheries and no end cost, where USGS is focusing on the headwaters down the tidal rivers, and NOAA is focusing on the tidal rivers down to the ocean.

What we're working to do is to increase our ability to assess the path of habitats, and understand the drivers and stressors of those habitats over the entire Chesapeake Bay Watershed. This project builds upon the National Fish Habitat Partnership, but with the richness of data in the Chesapeake Bay we're able to incorporate a lot more data, and are also looking to examine this data at a much finer spatial scale, which the local and state managers are saying is important for them to be able to utilize this information. Hopefully this project will be transferrable to other parts of the Atlantic Coast if successful. With that, I really appreciate the opportunity to present and highlight some of the work that USGS is involved in. I feel that we're just scratching the surface. We're looking to really grow this program to provide complementary science, and wanted to thank Pat Campfield and Toni Kerns and Lisa Havel and Deke Tompkins for helping us with the coordination, communication.

As well as my colleagues at NOAA, National Marine Fishery Service and U.S. Fish and Wildlife Service. We're really working together to try to complement our science to really hit the high marks of ASMFC science needs, so thank you, and happy to answer any questions you might have.

CHAIR DAVIS: Great, thanks very much for that, Tom. That's a great presentation and it's really great to see all the good science that USGS is doing in support of management of our ASMFC species. At this time, I'll ask if anybody on the Board has any questions for Tom.

MS. BERGER: I don't see any hands raised. I stand corrected, sorry, Lynn Fegley and Bill Hyatt.

CHAIR DAVIS: Okay, go ahead, Lynn.

MS. FEGLEY: I don't so much have a question as I just really want to thank Tom. You know this is pretty visionary and high time, you know that we have this linkage, and really have a means to bring to bear the scientific capacity at USGS. I just really love the fact that you are working through Pat

Campfield and reviewing those, you know those science priority reports from ASMFC. I just want to thank you for thinking this through and making it happen.

MR. O'CONNELL: Thanks a lot, Lynn, I appreciate that. We're excited about it.

CHAIR DAVIS: Okay, Bill Hyatt, you're up next.

MR. HYATT: Tom, I just had a quick question, just was wondering relative to the Chesapeake Project that you spoke about briefly. Just if you could comment on how much you folks for that project are drawing on work that was done by the North Atlantic Landscape Conservation Cooperative, or the Landscape Conservation data that they had collected over a number of years, of which USGS was an active partner.

MR. O'CONNELL: Thanks a lot, Bill. Yes, Steve Faulkner at our Center has worked with those Landscape Cooperatives. My understanding is that we're looking to build upon those efforts. One part of this effort was taking a lead to obtain data from all the different organizations pertaining to fish habitat and fish abundance throughout the Chesapeake Bay watershed.

We've successfully brought all that data together into a single database, and it's available to anybody. It's really trying to build off of the work that has already been done, and advancing that. I will follow up with Steve Faulkner's team, to make sure that my understanding is correct, but that is my assumption at right this point in time.
MR. HYATT: Excellent, thank you.

MS. BERGER: Dr. Chair, James Fletcher, there are no Board members but James Fletcher has his hand raised.

CHAIR DAVIS: Yes, sure, go ahead, Jim.

MR. FLETCHER: The question is, are you aware of the chemicals that are going into the water? You mentioned habitat, you mentioned fish passage, everything else. But I'm on a thing for years I ask about the estrogen in the water and affect in the reproduction of fish. Now it comes out that even the EPA is mentioning PFAS.

But the whole solution to the problem is to stop meniscal waste from being dumped into the water and pass it through some type of vegetative material. All of this is fine to talk about, but it's not a solution. The solution to pollution is pass the water through vegetation. Is it any chance at USGS will take on that issue? Thank you for your time.

MR. O'CONNELL: Great question, Jim, I appreciate you bringing it up. USGS has a very strong water quality monitoring program, and our Chesapeake Bay Fish Habitat specimen is working very closely to understand those drivers and stressors. We have a number of scientists, Vicky Blazer and Steve McCormick that have done a lot of work on endocrine destructors.

That is the big part of this Chesapeake Bay Habitat Assessment, is understand the status of these habitats and fish, and then try and understand what the drivers and stressors are, including contaminants like the ones you mentioned. We also just stood up a new PFAS lab in our West Virginia facility.

That is enabling us to examine PFAS contaminant levels in tissue samples of animals, and we've started some pilot projects this year. Happy to continue this conversation if there is interest of ASMFC, but we do have the expertise, we do have current projects, and be happy to discuss further if that is of any interest.

MS. BERGER: Tom Fote also has his hand raised at this point.

CHAIR DAVIS: Okay, Tom Fote, go ahead.

MR. THOMAS P. FOTE: Yes, Tom, nice to hear from you again. Too bad we can't see each other. Yes, I just wanted to point out that I sat through a presentation from USGS at the Pilots Commission discussing that you had looked at waters up in Pennsylvania that were not coming from sewer

plants but coming off farmland, and the high levels of endocrine disruptive.

I really appreciate it, because that had not really been put in the forefront as it is now, so we can look at what's coming into the Susquehanna and a few other areas in the Delaware River from what's coming up from farmlands.

MR. O'CONNELL: Thanks, Tom, it's great to hear your voice, and I can't believe a meeting has almost ended without Pat Augustine making a motion. I don't know if that has ever happened.

CHAIR DAVIS: Do we have any other hands?

MS. BERGER: No.

CHAIR DAVIS: Well, thanks again, Tom for that presentation and for being here today, much appreciated.

MR. O'CONNELL: You're welcome.

CHAIR DAVIS: All right at this time I'll ask if there is any other business to come before this Board today.

MS. BERGER: No hands raised.

ADJOURNMENT

CHAIR DAVIS: Okay thank you, well then, I will thank the Board today for a productive meeting, thank Brian for the excellent presentations, and for doing most of the heavy lifting today, and thank Caitlin Starks and Commission staff for all their work in support of this Board. With that I'll entertain a motion to adjourn.

MS. FEGLEY: So moved.

CHAIR DAVIS: Okay, was that Lynn?

MS. FEGLEY: Yes, it was.

MS. BERGER: Cheri Patterson has her hand up as a second.

CHAIR DAVIS: Okay, this Board will stand adjourned, thank you everybody.

(Whereupon the meeting convened at 10:22 a.m. on October 19, 2021.)

American Shad Habitat Plan for the Connecticut River

Connecticut River Atlantic Salmon Commission

Connecticut Department of Energy and Environmental Protection
Massachusetts Division of Fisheries and Wildlife
Massachusetts Division of Marine Fisheries
New Hampshire Fish and Game Department
Vermont Department of Fish and Wildlife
U. S. Fish and Wildlife Service
National Oceanic and Atmospheric Administration Fisheries Service

December 1, 2021

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1 INTRODUCTION

The Atlantic States Marine Fisheries Commission's (ASMFC) Amendment 3 to the American Shad and River Herring Fishery Management Plan (FMP) requires all states to submit a Habitat Plan for shad stocks in their jurisdiction. This document is an update to the first plan submitted and approved in 2014 for the Connecticut River basin. The ASMFC requested a collaborative effort on larger, multi-jurisdictional river plans such as the Connecticut River. Two federal agencies and the four basin member state agencies contributed the Plan. The Connecticut Department of Energy and Environmental Protection (CTDEEP) submitted a statewide plan, including the Connecticut portion of the Connecticut River, to accompany the CTDEEP Sustainable Fishing Management Plan for American Shad (CTDEEP, 2017). The CTDEEP, State of Connecticut American Shad Habitat Plan was approved by the ASMFC in 2021 (CTDEEP, 2021). The Connecticut River's American Shad population is under active restoration through the multi-agency Connecticut River Atlantic Salmon Commission (CRASC), signed into federal law in 1983 with complimentary State legislation (Gephard & McMenemy, 2004). The CRASC and its predecessor organization has served as the lead in obtaining both upstream and downstream passage measures at main stem dams and in coordinating state and federal agencies, commercial river users, and other partners on management topics for this species. The CRASC Technical Committee, under the policy guidance of the Commission, maintains Shad Studies and Fish Passage subcommittees that actively work on topics including shad habitat and access to habitat. The CRASC approved an updated version of the Connecticut River American Shad Management Plan in 2017 replacing the 1994 Management Plan. The 2017 Management Plan utilized a habitat-based approach to define minimum population targets for returns to the river and for the extensive segmented habitat reaches caused by dams in the main stem and tributaries. In 2020, CRASC Commissioners approved the Addendum "Fish Passage Performance" as part of that 2017 Management Plan and included criteria for adult and juvenile shad passage performance that will be defined later in this document (CRASC, 2020). The Federal Energy Regulatory Commission (FERC) approved both documents as a Comprehensive Management Plan[1]. This plan reflects that fish passage is an essential component of any habitat considerations for the restoration and management of the Connecticut River American Shad population.

2 HABITAT ASSESSMENT

The historic upstream extent of the species range on the main stem is Bellow Falls, Vermont, at rkm 280, with three main stem dams located within this range (Table 1 and Figure 1). For this assessment, we have considered habitat in the context of the main stem and tributary barriers that have fragmented, eliminated, or reduced access and altered habitat conditions throughout the basin. Surveys for shad eggs and larvae and spawning behavior have been conducted in the main stem within the state of Connecticut (Marcy, 1976) and from Holyoke Dam (rkm 139) to the Turners Falls Dam (rkm 198), Massachusetts. Marcy (1976) identified American shad spawning in the lower main stem river at river kilometer (rkm) 26 to the most upstream study site at rkm 87, Enfield, Connecticut, with major spawning areas identified as Windsor Locks (rkm 78), Wilson (rkm 74) and Rocky Hill (rkm 51). University of Massachusetts research has shown a relatively wide distribution of documented spawning primarily from egg and fish behavior surveys between the Holyoke Dam, Massachusetts (rkm 139) and the Turners Falls Dam, Massachusetts (rkm 198)

[1] FERC's List of Comprehensive Plans July 2020 can be accessed at https://www.ferc.gov/sites/default/files/2020-07/ListofComprehensivePlans.pdf

(Gilmore, 1975; Watson, 1970; Layzer, 1974; Kuzmeskus, 1977). Shad spawning habitat is located to varying degrees upstream of dam impoundments on both the main stem and identified tributaries and are subject to shifting (over space and time) with changing river discharge (Greene, et al., 2009). The University of Massachusetts conducted studies in the late 1960s and 1970s that showed shad spawning starting at rkm 140, just upstream of Holyoke Dam, to rkm 192, at 22 sampled sites (Kuzmeskus, 1977). Most of the preferred spawning habitat in this main stem reach begins upstream of the Holyoke Dam's impoundment, beginning approximately at rkm 180 and extending upstream to the Turners Falls Dam (rkm 198). Given the lack of consistency in geographically limited habitat assessments, we are currently unable to quantify habitat designations at a fine scale.

Table 1. Main stem dams on the Connecticut River from rkm 0 upriver to the historic upstream extent of American shad range, Bellow Falls, Vermont, at rkm 280.

River Km	Barrier	Designated extent of upstream impoundment/habitat break (rkm)[A]	Purpose	Status
110	Enfield Dam (historic site), Enfield CT	0	Barge canal use	no longer present
139	Holyoke Dam, Holyoke, MA	177	Hydroelectric power	Active, with fishways
198	Turners Falls Dam, Montague, MA	226	Hydroelectric power	Active, with fishways
228	Vernon Dam, Vernon, VT	273	Hydroelectric power	Active, with fishways
280	Bellows Falls Dam, Bellows Falls, VT	-	Hydroelectric power	Active, with fishways

[A] reported impoundment distance may vary slightly, designations attempt to consider transition in habitat features in these dynamic area

As part of the FERC relicensing process for the Turners Falls Dam/Project, Northfield Mountain Pumped Storage Facility, Vernon Dam/Project, and Bellows Falls Dam/Project that started in 2012, several studies specific to American Shad spawning and habitat, in relation to hydropower project operations, were proposed by the agencies and completed by the respective companies. In December 2020, both FirstLight Power (FLP) and Great River Hydropower (GRH) filed Amended Final License Applications (AFLA's). As part of the study phase of relicensing, FirstLight Power Study Report 3.3.6, examined shad spawning, spawning habitat and egg deposition in the areas of the NMPS and Turners Falls Project (FLP, 2016). The study area covered from the Vernon Dam tailwater to the Route 116 Bridge, Sunderland, MA. Their study (using splash counts) reconfirmed findings of spawning and habitat use/types described by earlier university studies, downstream of Turners Falls Dam. Survey work also identified shad spawning activity downstream of Vernon Dam several kilometers. The impoundment of the Turners Falls Dam extends very close to the Vernon Dam (1-2 kilometers) depending on operations and river discharge among the hydroelectric projects (Vernon, NMPS, Turners Falls).

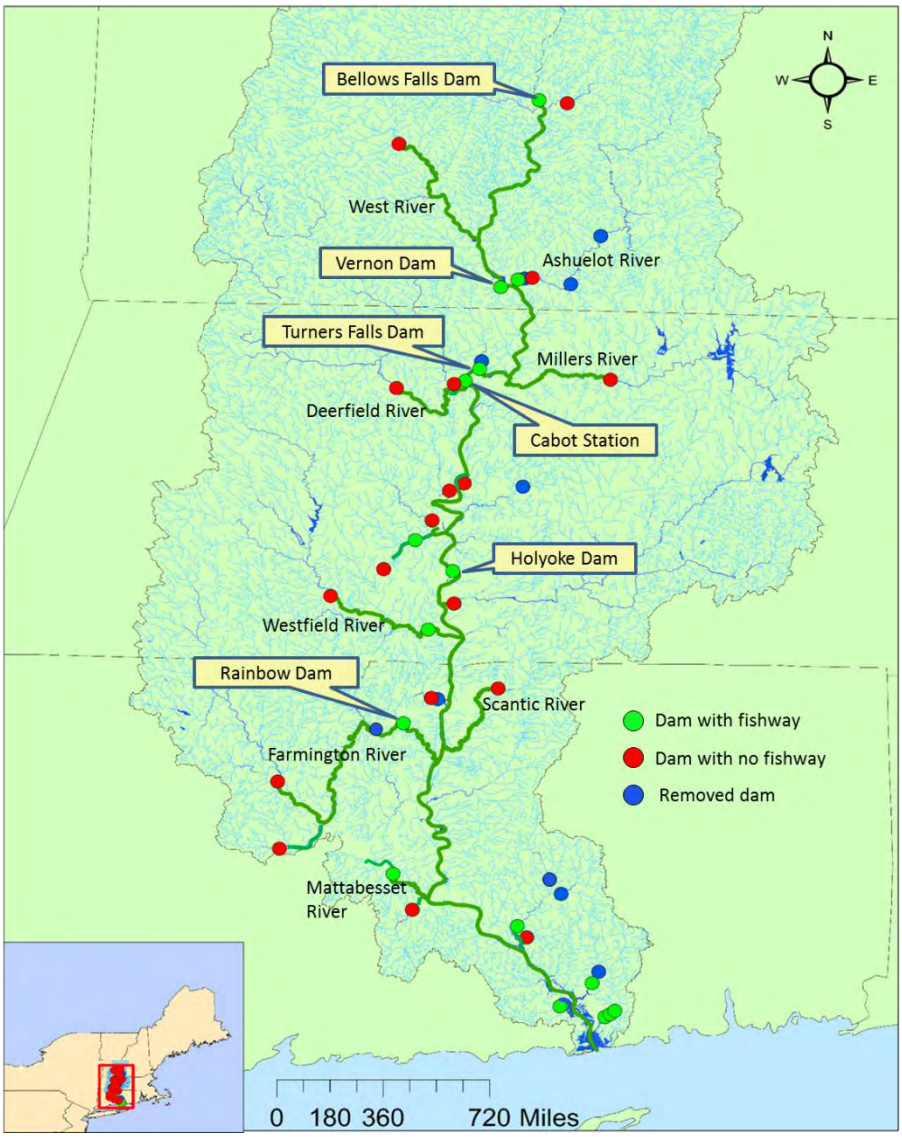

Figure 1. The current range of American shad (green line) in the Connecticut River basin.

A similar study to examine American Shad spawning activity in relation to project operations was completed between Vernon Dam and Bellows Falls Dam. The Study 21 "American Shad Telemetry Study" Final Report (2017) by TransCanada Hydro (sold to GRH same year) describes adult shad movements up to Bellows Falls Dam, ichthyoplankton net surveys for eggs, stage of development and back-calculated area of spawning origin (Normandeau, 2017). Results identifies shad spawning occurring in the riverine habitat downstream of Bellows Falls Dam as well as within the Vernon Dam impoundments and immediately downstream of Vernon Dam (surveyed to 2 km downstream). The report states that tracking of radio tagged shad and ichthyoplankton sampling identified spawning occurred most frequently over gravel-cobble substrates. Available spawning habitat was modeled based on cited criteria under a range of operational conditions. The report notes that habitat areas closest to the dams (Bellows and Vernon), are subject to the greatest variations in habitat (i.e., discharge, flow velocity, and substrate) when modeling between current minimum required flow and the maximum generation capacity. Thus, variations in sub daily

hydropower operations (frequency, timing, magnitude, and duration) are a concern to the agencies for persistent spawning habitat of American Shad.

Annual monitoring of juvenile shad has occurred upstream of Vernon Dam, in the lower impoundment and immediately below Vernon Dam (2 km) by the owners of Vermont Yankee Nuclear Power Station for 15 years, concluding in 2012, with its closure. Beginning in 2017, the Massachusetts Division of Fisheries and Wildlife and the U. S. Fish and Wildlife Service, have conducted a juvenile alosine production survey from the Bellows Falls Dam to the Holyoke Dam (Mattocks, 2019). That study has shown juvenile shad present in all sampled habitat types from August through November annually, using a random stratified cell approach and boat electrofishing gear. Comparisons among river segments from this study have also shown density dependent effects for juveniles sampled in the Turners to Holyoke segment when compared with fish data from both the Bellows to Vernon segment and Vernon to Turners Falls segment (Mattocks, 2019). Insufficient upstream fish passage measures at the Turners Falls Project reduce spawner access to upstream habitat, resulting in stockpiling of production in the Holyoke Pool and underutilized juvenile habitat/production up to the Bellows Falls Dam. The FERC relicensing process will be used to address these upstream passage issues as well as downstream passage concerns in addition to habitat concerns (daily and sub daily peaking operations). The CTDEEP also has maintained a long-term juvenile alosine production survey in the mainstem river from below Holyoke Dam, MA to Essex CT. The CTDEEP survey provides a valuable long-term data set that is used in the Sustainable Fishery Management Plan for Shad (CTDEEP, 2017).

Table 2. Connecticut River estimated spawning and rearing habitat for American Shad by main stem river segment (dam location) in relation to estimated adult shad production or return potential, and <u>minimum</u> annual target fish passage number by barrier. Production is fish/hectare of multiple age classes in a year (203 f/ha in mainstem and 111 f/ha in tributaries).

Reach	Ha	Adjust-ment	Ha	% of total	Adult Shad Return or Production	Project	Minimum target
Main stem Mouth to Holyoke	5,677	0.85	**4,825**	**54.8**	**979,498**		
tributaries (5)	*424*		*424*	*4.8*	*47,064*		
Main stem Holyoke to Turners Falls	1,369		**1,369**	**15.5**	**277,881**	**Holyoke Fish Lift passage**	**687,088**
tributaries (2)	*109*		*109*	*1.2*	*12,099*		
Main stem Turners to Vernon	762		**762**	**8.7**	**154,691**	**Turners Falls Ladder passage**	**397,108**
Tributaries [A] (1)	*139*		*139*	*1.6*	*15,429*		
Main stem Vernon to Bellows Falls	1,042		**1,042**	**11.8**	**211,559**	**Vernon Ladder passage**	**226,988**
tributary (1)	*139*		*139*	*1.6*	15,429		
Totals	**9,661**		**8,809**	**100.0**	**1,713,651**		

[A] Millers River habitat area undefined

Historic and, in some cases, current American shad distribution include three tributaries in the State of Connecticut, five in the State of Massachusetts, one in the State of New Hampshire, and

one in the State of Vermont (Table 3). Habitat information is based on the best information available which often is based on a limited qualitative assessment. It is important to note that it is difficult to categorize what type of habitats may have existed under current dam impoundments.

Table 3. The estimated spawning and rearing habitat for American Shad, by tributary in relation to estimated minimum annual adult shad production or return potential for tributaries (111fish/ha).

Tributary	Total rkm	Area (estimated) ha	Adult Shad Return or Production
Mattabesset, CT	36.3	54.5	6,044
Farmington, CT [A]	72.7	221.0	24,528
Scantic, CT	22.4	31.4	3,481
Westfield, MA	29.4	117.6	13,054
Chicopee, MA[B]		T.B.D.	
Manhan, MA	23.0	23.0	2,553
Deerfield, MA	21.5	86.0	9,546
Millers, MA[C]		T.B.D.	
Ashuelot, NH	60.0	139.0	15,429
West, VT	31.0	139.5	15,485
Total			90,119

[A] – The Pequabuck rkm and habitat area is included with the mainstem Farmington
[B] - First dam is ~1 rkm from confluence with numerous subsequent dams
[C] – Relatively high gradient tributary, more data required

3 HABITAT ACCESSIBILITY

Adult shad have varied degrees of access to main stem habitat to the historic extent of their range up to Bellow Falls Dam (VT) using a fish lift system at the Holyoke Dam (MA), three fish ladders at Turners Falls Dam (MA) where successful passage requires use of two fishways, and the Vernon Dam fish ladder (VT). Upstream fish passage efficiency remains a major concern and has been demonstrated to vary widely among these main stem facilities, with the Turners Falls fishway complex determined to be most problematic for upstream shad passage (Appendix 1). Annual shad passage counts at the second and final required ladder at Turners Falls Project have averaged 10% of the number of shad passed at the previous downstream Holyoke Dam, since some 2010 passage improvements at Turners Falls. Alternatively, the Vernon Dam fish ladder has annually passed 58% (annual average) of the shad counted passing from Turners Falls Project since 2012 fish ladder improvements, excluding the 2020 outlier season due to an entrance gate issue identified in 2021 (Appendix 1). The previously noted FERC relicensing process for Turners Falls has with company agreement, included plans to install a new upstream fish passage facility as noted in their Amended Final License Application (AFLA) submitted to FERC in December 2020 with other proposed passage and protection measures (FirstLight Hydro LLC, 2020; Northfield Mountain LLC, 2020). GRH has also submitted an Amended Final License Application with FERC (December 2020) that provides estimated funds to improve fish passage efficiencies without going into specific detail (Great River Hydro, LLC, 2020). GRH also has proposed (in consultation with the agencies and other stakeholders) operational changes that will create “more stable impoundment water surface elevations…reduce the magnitude and frequency of sub-daily operational changes in discharge from each project, by increasing the amount of time that the Projects are operated in an inflow equal outflow mode” (Great River Hydro, LLC, 2020). The proposed shift in operations will benefit American Shad habitat for all life stages and life history (spawning and migrations). Both AFLAs are presently under agency review. The federal fishery

agencies are also working on fishway prescriptions and habitat recommendations as part of this FERC process and Federal Power Act authorities.

Table 4. Identified American shad tributaries of the Connecticut River basin with first and second dam locations and status of passage.

Tributary	Distance to 1st upstream dam (rkm)	First Dam	Passage provided by	2nd Dam (rkm)	Status	3rd Barrier (rkm) and notes
Mattabesset	11	StanChem	Denil Ladder	Kensington (36)	Alaskan Steepass	Natural waterfall (38)
Farmington [A]	13	Rainbow	Vertical slot	Lower Collinsville (60)	Plans for removal	Upper Collinsville (62), Denil ladder construction 2021
Scantic	21	Somersville	None, not planned	-	-	-
Westfield	7	West Springfield	Denil Ladder	Woronoco (30)	Upstream extent of habitat	-
Chicopee	2	Dwight	None	Chicopee (5)	Nothing planned at this time	-
Manhan	5	Manhan	Denil Ladder	Unnamed (18)	Upstream extent of habitat	-
Deerfield	21	Great River Hydro Dam #2	Upstream extent of habitat	-	-	-
Millers	14	Erving Paper	Partial breach	New Home (22)	Nothing planned at this time	-
Ashuelot	3	Fiske Mill	Fish lift	Lower Roberts (5)	Future U/S passage plan is based on passage trigger at Fiske	-
West	31	Townshend (ACOE)	Upstream extent of habitat	-	-	-

[A] Final barrier is Hogback Dam at rkm 72. The Pequabuck River is a tributary to the Farmington with 17 ha of habitat.

The 2020 American Shad Benchmark Stock Assessment and Peer Review Report provides a comprehensive review of the many issues with fish passage for adult and juvenile shad on both upstream and downstream passage measures (ASMFC, 2020). The Report also contains a modeling analyses to quantify losses of both habitat and adult production from dams that strongly support the need to have substantial improvements in the "performance" of fishways related to percentage rate of passage success, time to pass (delay issues), and survival from passage. These passage metrics must also be considered in their cumulative effects given fragmentations of habitat

by dams in shad rivers like the Connecticut River basin. The need and benefits of having improved, achievable passage performance criteria is well supported and necessary with improvements in fish behavior research and fish passage engineering (USFWS, 2019).

Access to tributary habitat in the Connecticut River basin is often limited due to the presence of dam(s) that often are located less than 20 km from the confluence with the main stem river (Table 4).

Distances of unobstructed access to the first barrier and type of available passage are noted with status of the next barrier, in Table 4. However, as is the case on the main stem, fish passage efficiency is poorly understood on tributary dam fishways. The first dam on the Farmington River has the Rainbow Fishway, in operation since 1976, which is known to not effectively pass shad upstream. This State-owned facility is planned for a replacement in the future with some noted concerns for downstream passage effectiveness. This dam and power station are nonjurisdictional with FERC, restricting agency options on passage and protections. The Westfield River (MA) is the next major tributary with substantial habitat access provided by a Denil fishway at the West Springfield Dam. This fishway has not been evaluated, but shad passage efficiency is expected to be suitable based on the best professional judgement of agency biologists. Other substantial, but not studied tributaries that may provide shad spawning and nursery habitat include the lower Deerfield River (MA) up to its first dam (Dam 32), a distance of 21 rkm and the Millers River (MA), which like the Deerfield quickly transitions into higher gradient reaches and larger substrate types, but also includes more reaches of run habitat between riffles than the Deerfield River. Appendix 2 provides data on barrier locations, habitat, passage types and related data, specific to the Connecticut River basin that is under continued development by the Technical Committee for all American Shad river systems.

4 THREAT ASSESSMENT

4.1 Threat: Barriers to Migration Upstream and Downstream

4.1.1 Recommended Action:

The 2020 American Shad benchmark Stock Assessment and Peer Review Report provides a comprehensive review of the many issues associated fish passage for adult and juvenile shad on both upstream and downstream passage measures and includes the following quotes (ASMFC, 2020):

> *River basin management plans are increasingly placing upstream and downstream passage impacts, needs, and recommendations in the context of cumulative dam/hydropower effects and requiring passage performance measures that are quantitatively defined rather than the open-ended passage terms of "safe, effective, and timely".*
>
> "*Commerce and Interior have not included any specific performance standards that would be used to test the effectiveness of the fish passage facilities…Without specific performance standards to analyze, there is no basis for assessing the benefits of effectiveness testing for fish passage and determining whether effectiveness testing would or would not provide benefits to Alosines*..." (FERC, 2018)

The Plan's Recommended Actions relative to this threat are consistent with the objectives listed in the CRASC's Connecticut River American Shad Management Plan (2020) which includes the following fish passage management objectives:

1. Establish safe, timely, and effective upstream and downstream fish passage for returning adults, post spawn adults, and juveniles [Completed refer to Addendum]; and
2. Establish upstream passage performance measures, addressing fishway attraction, entry, internal passage efficiency and delay at these three stages, as suitable information is available, to support other objectives of this Plan [Completed refer to Addendum]; and
3. Establish downstream performance measures, for adult and juvenile life stages that maximizes survival for through-project passage and that address downstream bypass route attraction, entry, passage efficiency, and delay, as suitable information is available to support objectives of this Plan [Completed refer to Addendum].

The 2020 CRASC Plan Addendum on Fish Passage Performance includes the following Criteria or Objectives for both adult (upstream and downstream) and juvenile (downstream) American Shad for hydroelectric projects in the Connecticut River basin:

1. Upstream adult passage minimum efficiency rate is **75%**, based on the number of shad that approach within 1 kilometer of a project area[A] and/or passage barrier. Passage efficiency is [(# passed/# arrived)*100];
2. Upstream adult passage time-to-pass (1 kilometer threshold) is **48 hours or less** based on fish that are passed (requires achieving Objective #1);
3. Downstream adult and juvenile project passage minimum efficiency and survival rates are each **95%**, based on the number of shad that approach within 1 kilometer of a project area[A] and/or passage barrier and the number that are determined alive post passage (not less than 48 hours evaluation). Passage efficiency is [(# passed/# arrived)*100] and passage survival is [(# alive downstream of project/# passed)*100].
4. Downstream adult and juvenile time-to-pass is **24 hours or less,** for those fish entering the project area[A].

[A] – Project area shall be defined as comprising the river within 1 km of the up- and downstream extent of a hydropower facility and its footprint components. Where a powerhouse is separated from a dam, e.g., by a power canal, this will also include any bypassed reach of the river. The applied definition for 1 km threshold, includes situations whereby a bypassed river reach exists (with regulated/altered flows) from the development and use of a power canal system, by a hydropower operator. In such cases, the location of the dam proper may be several kilometers upstream of the terminus of the power canal system. For upstream passage, the terminus of the power canal and any associated hydropower facility will be the approach basis for the 1 km project area, not the dam. Alternately, for downstream passage, the dam and gatehouse will serve as the basis for the 1 km project approach area, not the generation facilities in the power canal.

Fishways should be evaluated for upstream passage performance (number available relative to passed and time-to-pass) and enumeration of passed fish should occur annually. Downstream passage performance should be evaluated at both main stem and tributary projects/fishways for both adults and juveniles. Study plans may include radio and PIT tags to determine rate of attraction to near field, retention in the entry area, fishway entry/fall backs, and successful passage to exit area in relation to a range of operational conditions and other factors relevant to study

goal/objectives (possible survival and injury rates etc.). Available information suggests delays in both upstream and downstream passage of adult shad are occurring and should be examined and as issues are noted, measures should be implemented and/or developed to achieve CRASC passage performance criteria. Cumulative effects from passage efficiency, delay, and through project mortality are of particular concern given the number of hydroprojects in shad habitat and achieving the goals and objectives of the Plan. Ideally, pre-season, in-season and post season fishway inspections by federal Fish Passage Engineers would occur to increase the ability to identify any issues and ensure operations are following design criteria, to prevent negative impacts that can be avoided in the relatively brief passage season.

4.1.2 Fish passage/habitat access mainstem Connecticut River (MA, NH, VT)

Fish passage performance criteria from the CRASC American Shad Management Plan have been previously described. American Shad have access in the main stem Connecticut River to the historic upstream extent of their range, Bellows Falls, Vermont, using fishways of varied design and operation and efficiencies (Table 1, Figure 1, Appendix 1). Upstream passage for shad includes a fish lift system at Holyoke Dam, upgraded in 2005, as part of that dam's FERC relicensing process. Based on both historic unpublished studies on shad movement, the Holyoke fish lift system (1976-present) passed between 40 to 60% of the adult shad that entered the river mouth in the spring. Additional modifications to that facility completed in 2016, to improve up and downstream passage efficiency/protections, may have affected upstream fish passage rates (percentage passing and time to pass). A mark-recapture study using fish tagged at the mouth should be developed to answer questions on the proportion of shad passage at Holyoke in relation to the population entering the river and factors of influence on passage rates.

Upstream Passage Measures

Turners Falls Dam, Massachusetts - Upstream shad passage at Turners Falls Dam has been problematic since the opening of its three fishways in 1980. Fish are required to enter and use at least two fishway ladders at this project to bypass this barrier system. Fishway designs were based on the best available information at that time. The Cabot Station (powerhouse), at the end of a 3.4 km power canal off the Turners Falls Dam, is the primary location of shad attraction on their upstream migration and has a modified "Ice Harbor" design ladder. Fish that successfully pass that ladder must then proceed up the power canal to the Gatehouse, which contains the Gatehouse Fish Ladder (vertical slot design), that has two entrances from the canal. Fish may also migrate up the "bypassed reach" that parallels the power canal, to the base of the dam and use the "Spillway Ladder" (modified Ice Harbor design) that directs fish at its "exit" end to the entrance of the Gatehouse Ladder. Typically, spill at the dam is less than 1,000 cfs, with river flow directed to the power canal for power station use (up to 17,000 cfs). As part of the FERC relicensing process the facility owners have proposed to build a new fish lift facility at the base of the dam that would then direct fish into the Gatehouse Ladder. The discharge level in the bypassed reach, is proposed for seasonal flow increases as described in the FirstLight Power AFLA that would be tied to Shortnose Sturgeon spawning and early life stage needs in the bypass reach with recognition of fish passage needs for shad. The federal agencies are working on fish passage prescriptions (Federal Power Act; Section 18) and fish habitat recommendations (10J) for this project area currently.

Vernon Dam, Vermont/New Hampshire - Upstream passage at Vernon Dam is made possible through a fish ladder that is a modified Ice Harbor design in its lower section and serpentine vertical slot design in its upper section. This ladder became operational in 1981. Like other

fishways, there have been modifications and adjustments made to address areas of concern. Following several years of low passage counts for shad, in 2011 a design feature/setting was identified as an issue by a USFWS Fish Passage Engineer. Corrective measures were completed with a marked increase in shad passage counts annually noted since 2012 (Appendix 1).

The CRASC Management Plan (2017) and its Fish Passage Performance Plan (2020) define downstream passage performance criteria for adults and juvenile shad that access habitat upstream of hydropower facilities. Cumulative effects from the multiple dams/projects in the basin may be impeding upstream habitat reach goals and objectives. The State of Connecticut Marine Fisheries Division has documented a long-term decline in the proportion of repeat spawners in the shad stock and modeling results (CRASC 2020) suggest poor downstream passage may be driving that trend.

Downstream Passage Measures

Holyoke Dam, Massachusetts - Numerous and varied downstream passage and protection measures have been explored and implemented at the Holyoke Dam to protect fish using the historic upstream habitats. Currently, the Holyoke Dam operates a Bascule Gate with a specially designed "Alden Weir" to facilitate downstream passage of spent American Shad moving towards the power stations intake/forebay to the proximally located gate. This gate is operated for downstream passage of fish from April through July, with dates or operation specified in a CRASC Downstream Passage Notification Letter, issued by the Connecticut River Coordinator. The Holyoke Dam, owned and operated by Holyoke Gas and Electric, completed substantial downstream passage improvements at the Hadley Falls Station in 2015, effective for 2016. A reduced space, full depth bar rack with 2.0 inch clear spacing was installed in front of the station intakes. A novel design downstream bypass with surface and mid-depth entrances and transfer system were placed into this rack. These bypasses direct fish to the downstream spill release from the nearby Alden Weir, in the project's adjacent Bascule Gate. A pre-existing downstream bypass structure, this weir's water release was hydraulically adjusted to direct water/fish at the base of the dam apron, up into the air and into a newly constructed plunge pool that was designed to meet USFWS Fish Passage Criteria. The "jump" reduces landing velocity into the pool and prevents disruption of the attraction flow/jet to the spillway fishlift entrance that passes underneath this jump. An angled retaining wall, near that fish lift entrance, that had interacted with a portion of the weir's spill was also removed.

A second route for downstream shad passage at Holyoke includes the power canal, which has a gatehouse located at its upstream end, adjacent to the dam structure. Shad that are directed or move into the canal will swim and/or drift to a full depth angled weir that covers the entire canal approximately 1 km downstream. The weir bar spacing is designed for juvenile fish guidance as well. At the downstream corner of this acutely angled weir is the entrance to the downstream fish passage pipe. The pipe conveys fish into the tailrace of the Hadley Falls Station, where the pipe discharges directly into deep water from a height of several meters.

Turners Falls Dam - At the Turners Falls Dam/Project, adult and juvenile shad may pass using the following routes; 1) spill at the dam, 2) Station 1 through turbines (power station off the main power canal), 3) Cabot Station through turbines, 4) Cabot Station surface fish bypass/partial depth reduced rack spacing, and 5) Canal emergency spill gates. Downstream fish passage studies for both juveniles and adult shad have been completed for FERC relicensing. The agencies will be seeking the installation and operation of necessary measures to achieve CRASC downstream fish

passage performance criteria for the project for adults and juveniles. These measures will likely include 1) plunge pool at the dam for spilled fish, 2) fish exclusion rack on side of power canal to Station 1, 3) full depth exclusion rack for turbines at Cabot, with downstream bypass passage entrances, 4) upgrades to existing surface bypass, sluiceway, and its associated structures.

Northfield Mountain Pumped Storage Facility, Massachusetts - The Northfield Mountain Pumped Storage Facility (NMPS) is also owned by Firstlight Power, they have also completed FERC studies examining entrainment of early life stages, adult shad upstream and downstream movements, and operational models on project area influences of flow during pumping and generation over a wide range of river discharge values. The company has proposed a full depth exclusion net seasonally installed to prevent juvenile (outmigrant size) entrainment following the CRASC downstream passage dates for juvenile shad protection (August 1 through November 15).

Vernon Dam - At Vernon Dam adult and juvenile shad may pass using the following routes; 1) spill at the dam or trash sluice, 2) through the stations turbines, 3) guidance from a partial depth and partial length louver which directs fish into the primary fish bypass pipe with a secondary, smaller bypass pipe on the Vermont near-shore side. GRH also completed downstream passage studies on both adult and juvenile shad as part of the relicensing process. The owner/operators have not proposed any specific plans for additional downstream passage measures but included dollar estimates in their AFLA (Great River Hydro, LLC, 2020). The agencies will seek the installation and operation of necessary measures to achieve CRASC downstream fish passage performance criteria for the project for adults and juveniles.

4.1.2.1 Agencies with regulatory authority:

The Connecticut River Policy Committee and its State and Federal agency members (predecessor of CRASC) had completed agreements with main stem hydropower operators that led to the installation and or operation of fish passage facilities to facilitate upstream passage on the main stem dams identified. The individual States have their independent authorities related to diadromous fish passage and management and the U. S. Fish and Wildlife Service and National Marine Fisheries Service have fishway prescription authority through the Federal Power Act, used in connection with FERC. The CRASC operates a Fish Passage Subcommittee, under its Technical Committee, which has been a forum to coordinate inter-agency staff, research, and activities with the power companies in both official and unofficial capacities, in a regular and ongoing process. The CRASC issues a schedule of Upstream Passage Operation Dates through the Connecticut River Coordinator, annually in March that specifies species, lifestage, dates and hours of operations.

4.1.2.2 Goal/Target:

The CRASC Management Plan (2020) includes goals and objectives that are quantified in terms of the entire population as well as within the river basin's many segmented habitat reaches. Adult population targets are described as minimum values, based on run data and accessible habitat for the target reference year (1992) described in that plan. Upstream passage efficiency (proportion of arrivals to passed and time to pass) performance criteria have been developed and are part of the Management Plan Addendum approved in 2020. Downstream passage measures must also address Addendum defined passage survival rates for both adult and juvenile shad as well as time-to-pass through project (i.e., delay). Standardized pre-season fishway inspections should be conducted by USFWS Fish Passage Engineers. This work has been focused on main stem facilities given staff limitations and includes examining and addressing site specific concerns with the owner/operators. Habitats that are accessed using fishways must also provide downstream passage measures that

are also defined in the plan, particularly to address cumulative effects of these projects and achieve goals and objectives.

4.1.2.3 Progress:

FERC relicensing is ongoing for Turners Falls Project, Northfield Mountain Pumped Storage Facility, Vernon Project, and Bellows Falls Project. The update to the CRASC Management Plan in 2017 and the Fish Passage Performance Addendum (2020) were important management steps to better define agency goals and objectives considered achievable and necessary in the ongoing effort to restore this population in its historic range as well as providing minimum escapement targets and stock structure metrics. The Management Plan and its Addendum are approved Comprehensive Management Plans by FERC.

In December 2020, both owners of five main stem hydroelectric projects submitted their Amended Final License Applications to FERC. At this time, FERC is in the process of considering the status of those submissions, including a June 2021 additional information submission that was required for FirstLight, in an internal review process.

Vernon Dam - At Vernon Dam, GRH has been working with the state and federal agencies on ongoing studies and improvements to that facility's fish ladder. In the fall of 2019, GRH installed a series of in-ladder modifications, designed by a USFWS Fish Passage Engineer. Relicensing study results of tagged shad within the ladder suggested a potential problem with two corner pools and the modification were made to reduce turbulence. The company continues to work on addressing potential areas of improvement for that fishway. In June of 2020 and 2021, very low river discharge levels led to occurrences of extremely low tailwater elevations at this facility that at times impacted the ladder entrance gates ability to maintain desired flow conditions. In September 2021 GRH contacted the agencies to report their identification of the issue affecting the entrance gate setting and measures to resolve that for the 2022 upstream fish passage season.

Holyoke Dam - Improvements for downstream passage were completed in 2015 at Holyoke Dam and the Hadley Falls Power Station. The fish passage modifications that will benefit American Shad include a full depth reduced space trash rack (2.0 inch clear spacing) that will help exclude adult shad from entrainment into the station's two turbines and a new surface and midwater downstream bypass entrances in that rack system. The bypasses discharge into the modified bascule gate discharge on the dam (also provides downstream passage) that was improved by the removal of a "wing" structure for the spillway ladder entrance near the edge of the dam apron. In addition, on the dam apron, the "bypass water" flow was structurally modified with a lip that projects the flow over the spillway fish entrance jet, into a constructed release pool with required depth, velocity, and area (all designs meet USFWS Fish Passage Criteria). The spillway entrance was also modified from an upper water column gate, to full depth, to facilitate sturgeon entry and passage. These measures were all in place and operating for the 2016 fish passage season.

Ongoing meetings with HGE at the Holyoke Project have resulted in adjusting operations, including effective in 2020 a new agency prescribed threshold daily count values to trigger and conclude earlier daily lift openings for peak run timing. The agencies also agreed to reduced lift operation frequency, also based on daily passage data, for the first two weeks of July.

4.1.2.4 Timeline:

The FERC relicensing process has reached a late-stage development in the process started in 2012 for the noted mainstem projects. The December 2020 AFLA submissions' by First Light Power and GRH, are in review by FERC with additional information required from Firstlight submitted

in June 2021. The issuance of a Ready for Environmental Analyses by FERC would start the time windows for fish passage prescription and habitat recommendation submissions by USFWS and NOAA and State and other intervener recommendations.

4.1.3 Fish passage/habitat access Mattabesset River (CT)

The first barrier on the Mattabesset River, StanChem Dam has a Denil ladder. The next upstream barrier, Kensington Dam, had an Alaskan Steepass ladder installed in 2019. At this time, the State believes no additional fish passage measures for shad is needed upstream of Kensington Dam which provides 2km of habitat to the base of falls (Table 3).

4.1.3.1 Agencies with regulatory authority:

The State of Connecticut has legal authorities regarding dams and fish passage at this small non-hydropower dam.

4.1.3.2 Goal/Target:

Achieve goals and objectives defined in the CRASC 2017 American Shad Plan and the defined passage performance in the 2020 Addendum. An annual run of 6,000 American Shad is the minimum population target for this tributary (Table 3).

4.1.3.3 Progress:

Access to all historic habitat has been achieved.

4.1.3.4 Timeline:

No additional habitat work is planned at this time.

4.1.4 Fish passage/habitat access Farmington River (CT)

Currently upstream and downstream passage at the Rainbow Dam are management issues at this FERC non-jurisdictional dam/project (Table 3). The Rainbow Fish Ladder is a vertical slot designed and owned by the State of Connecticut. The fish ladder opened in 1976 and is planned for replacement by the State of Connecticut. There are concerns for downstream protection of outmigrating adults and juveniles given the current design (trash rack depth/clear spacing) and smaller turbine sizes of the power station. The Winchell Smith Dam, next upstream structure, is considered a possible barrier to upstream movement of shad at lower flow levels. The Lower Collinsville Dam is owned by the State and is planned for removal, no target date available. The Upper Collinsville Dam has a FERC license and planned construction for a Denil Fish Ladder in 2021. The Pequabuck River is a tributary of the Farmington River and the existing Bristol Brass Dam is the upper extent of what the State of Connecticut considers shad habitat.

4.1.4.1 Agencies with regulatory authority:

The Rainbow Dam is not a FERC licensed jurisdictional dam and the fish ladder was installed by the State of Connecticut using its own funds through an agreement with the owners. The State of Connecticut has developed design plans to replace the vertical slot fishway. The State does not have construction funds currently for a new upstream fishway.

4.1.4.2 Goal/Target:

Achieve goals and objectives defined in the CRASC 2017 American Shad Plan and the defined passage performance in the 2020 Addendum. An annual minimum run of 24,500 shad is the target for this tributary. A goal is to install a new upstream fishway at the Rainbow Dam and discontinue the use of the ladder for shad passage. Downstream passage protections for adults and juveniles have also been identified a concern. Explore options for the removal for the degraded Winchell Smith Dam that is believed to impede upstream movement in lower flow conditions. Removal of

the lower Collinsville Dam will provide shad with access to the next upstream dam, Upper Collinsville that is in the process of upstream and downstream passage construction (completion fall 2021).

4.1.4.3 Progress:

Design plans for a Rainbow Dam fish lift are completed but the CTDEEP has additional information in review on best options and other related concerns (e.g., downstream passage measures). The Winchell Smith Dam will be monitored as it deteriorates, and it will be determined if removal or a fishway is necessary. Engineered plans to remove the Lower Collinsville Dam are in progress. The Upper Collinsville fish ladder is expected to be completed by late 2021.

4.1.4.4 Timeline:

Given the construction cost of the Rainbow Fish Lift system, it is unclear how long it will take to fund. The design for the Lower Collinsville Dam removal is underway but there is no firm timeline on when the dam will be removed.

4.1.5 Fish passage/habitat access Scantic River (CT)

The previous first barrier on the Scantic River, Springborn Dam was removed in 2017 by state and federal agencies. Currently, accessible shad habitat extends upstream to the Somersville Dam, an additional 4km of habitat. There are no fish passage or removal plans at this time for the Somersville Dam which is believed to be the upstream extent of shad habitat by the State (Table 3).

4.1.5.1 Agencies with regulatory authority:

The State of Connecticut has legal authorities regarding dams and fish passage at this small non-hydropower dam.

4.1.5.2 Goal/Target:

Following the removal of the Springborn Dam in 2017, the plan for the next dam remains under future consideration. An annual minimum run of 3,400 shad is the target for this tributary.

4.1.5.3 Progress:

The first upstream barrier on the Scantic River, Springborn Dam was removed by state and federal agencies in 2017, opening an additional 5 kilometers of river habitat to fishes including American Shad. Assessment of the habitat upstream of the current first mainstem barrier, Somersville Dam needs occur in addition to determining what species are currently utilizing downstream habitat.

4.1.5.4 Timeline:

Not applicable at this time.

4.1.6 Fish passage/habitat access Westfield River (MA)

All historic shad habitat is accessible with passage at the West Springfield Dam from a Denil Ladder and downstream passage measures also in place (Table 3). The next barrier on this tributary is the Woronoco Dam which is at the historic upstream extent of shad habitat.

4.1.6.1 Agencies with regulatory authority:

The Commonwealth of Massachusetts has legal authorities regarding dams and fish passage and the U. S. Fish and Wildlife Service and National Marine Fisheries Service have authority through the Federal Power Act and through FERC for licensed hydropower dam/projects. Both West Springfield and Woronoco Dam/projects are licensed by FERC.

4.1.6.2 Goal/Target:
Achieve goals and objectives defined in the CRASC 2017 American Shad Plan and the defined passage performance in the 2020 Addendum. An annual minimum run of 13,100 shad is the target for this tributary.

4.1.6.3 Progress:
There are no identified needs for other passage at this time.

4.1.6.4 Timeline:
Not applicable at this time.

4.1.7 Fish passage/habitat access Chicopee River (MA)
Accessible habitat in this tributary is restricted to approximately 2 km from its confluence with the Connecticut River. There is a high density of closely placed hydropower dams that proceed upstream from that point. The Dwight Street Dam is the first upstream barrier with a powerhouse located downstream of the dam approximately 1.0 km.

4.1.7.1 Agencies with regulatory authority
The Commonwealth of Massachusetts has legal authorities regarding dams and fish passage and the U. S. Fish and Wildlife Service and National Marine Fisheries Service have authority through the Federal Power Act and through FERC for licensed hydropower dam/projects.

4.1.7.2 Goal/Target:
There have been unexecuted plans to stock pre-spawn shad, transferred from Holyoke Fish Lift, into the impoundments of the upstream dams with follow up sampling to determine if there is juvenile production. This tributary system requires more study by the agencies considering the complexity of closely placed dams in succession.

4.1.7.3 Progress:
No pre-spawn stocking of shad or herring has occurred to date. It is possible that these stockings, with evaluation for production, may occur in the near future. Regularly occurring spring adult river herring population assessment have consistently documented high relative abundances (adult shad) in the lowermost accessible reach that is surveyed with boat electrofishing in May and June annually.

4.1.7.4 Timeline:
Not defined at this time, given other ongoing priorities.

4.1.8 Fish passage/habitat access Manhan River (MA)
A Denil fish ladder was installed at the first dam on the Manhan (Town of Easthampton) in 2014 that is located 5 miles from its mouth located in the "Oxbow" (Table 4). The ladder provides fish access to habitat up to 18 kilometers upstream where an unnamed dam occurs on its main branch. There is limited habitat for shad in the lower reaches of this system due to its small size (width and depths). This tributary has a total of 23 river kilometers with an estimated 23.0 hectares of habitat. All shad habitat is now accessible.

4.1.8.1 Agencies with regulatory authority
The Commonwealth of Massachusetts has legal authorities regarding dams and fish passage. As the Manhan Dam is non-hydro power, a cooperative approach was developed with the Town that owns the dam to operate and maintain the fish ladder.

4.1.8.2 Goal/Target:
Achieve goals and objectives defined in the CRASC 2017 American Shad Plan and the defined passage performance in the 2020 Addendum. An annual minimum run of 2,553 shad is the target for this tributary.

4.1.8.3 Progress:
No adult shad have been documented passing this fishway based on video monitoring to date. Both adult Blueback Herring and American Shad have been trucked and released by the USFWS in several years into habitat upstream of the dam.

4.1.8.4 Timeline:
Not applicable at this time.

4.1.9 Fish passage/habitat access Deerfield River (MA)
The lower Deerfield River contains an estimated 86 hectares of shad habitat upstream to the first dam, located at rkm 21.5 (Table 3). From its confluence with the Connecticut River, this tributary gains elevation rapidly moving upstream after the first dam, habitat becomes unsuitable for shad and a series of hydropower dams begin in relatively close sequence. All shad habitat is considered accessible.

4.1.9.1 Agencies with regulatory authority
The Commonwealth of Massachusetts has legal authorities regarding dams and fish passage and the U. S. Fish and Wildlife Service and National Marine Fisheries Service have authority through the Federal Power Act and through FERC for licensed hydropower dam/projects.

4.1.9.2 Goal/Target:
Achieve goals and objectives defined in the CRASC 2017 American Shad Plan and the defined passage performance in the 2020 Addendum. An annual minimum run of 9,546 shad is the target for this tributary.

4.1.9.3 Progress:
There are no identified needs for passage at this time.

4.1.9.4 Timeline:
Not applicable at this time.

4.1.10 Fish passage/habitat access Millers River (MA)
The Millers River is a large tributary system that includes a relatively rapid, increase in elevation that creates a high percentage of riffle and run habitat over rock substrate from its confluence with the Connecticut River. There are interspersed stretches of slower flat water but the quantity of suitable shad spawning, and nursery habitat is not known and requires additional study. However, adult shad tagging studies that have been conducted as part of FERC relicensing studies, as well as a USGS Conte Lab tagging study in 2011, would support the statement that this tributary was not utilized by shad based on those tagging study results. The first dam is located at rkm 14 and is partially breached with the second barrier (hydropower dam) located in at rkm 22 (Table 4).

4.1.10.1 Agencies with regulatory authority

The Commonwealth of Massachusetts has legal authorities regarding dams and fish passage and the U. S. Fish and Wildlife Service and National Marine Fisheries Service have authority through the Federal Power Act and through FERC for licensed hydropower dam/projects.

4.1.10.2 Goal/Target:

There is no estimated annual adult production run size at this time.

4.1.10.3 Progress:

There are no identified needs for shad fish passage at this time.

4.1.10.4 Timeline:

Not applicable at this time.

4.1.11 Fish passage/habitat access Ashuelot River (NH)

In 2012, the Fiske Mill Dam, the first barrier 3 km from confluence with the Connecticut River, installed a fish lift. The agencies and FERC have contacted the owner operator with concerns over fishway operation, monitoring and evaluation that remain unresolved. This project is currently in the FERC relicensing process that was initiated in January 2021. The McGoldrick Dam, which had been the next upstream dam (rkm 4), was completely removed in 2001. As shad passage at Fiske Mill Dam becomes documented, upstream passage options to pass fish upstream of both Lower Roberts (rkm 5) and Ashuelot Paper (rkm 5.5) hydropower dams will be developed. Once fish can pass these additional two dams, most targeted spawning, and nursery habitat (90%) will be completely accessible as two additional unmaintained dams have been completely removed from identified shad habitat in 2002 (Town of Winchester) and 2010 (Swanzey Woolen Mill).

4.1.11.1 Agencies with regulatory authority:

The State of New Hampshire has legal authorities regarding dams and fish passage and the U. S. Fish and Wildlife Service and National Marine Fisheries Service have authority through the Federal Power Act and through FERC for the identified dams.

4.1.11.2 Goal/Target:

Achieve goals and objectives defined in the CRASC 2017 American Shad Plan and the defined passage performance in the 2020 Addendum. An annual minimum run of 15,429 shad is the target for this tributary.

4.1.11.3 Progress:

Annual stockings of approximately 430 pre-spawn shad have been conducted by state and federal fishery agencies from 1998 through 2019. Upstream passage options for the remaining dams will be explored as adult fish are documented passing the Fiske Mill Dam. The Fiske Mill Project is in relicensing process with FERC, initiated in 2021. Both Federal agencies (USFWS and NOAA), NHFG and NH DES submitted study request letters in March of 2021 as part of that process.

4.1.11.4 Timeline:

The FERC process for Fiske Mill began in 2021. State and federal agencies expect to address what are considered passage issues and seek to determine what fish may occur below the dam. Upstream passage measures for shad around the second and third dams on the lower Ashuelot will be implemented as returning adult shad are documented at the Fiske Mill Dam fish lift.

4.1.12 Fish passage/habitat access West River (VT)

The West River is primarily a high gradient, large substrate system in the Green Mountains. Its confluence with the Connecticut River has been inundated by the Vernon Dam creating an area known as Retreat Meadows. This shallow protected off mainstem area is approximately 65 ha in size and is known to be used by juvenile shad. The first upstream barrier on the river is Townshend Flood Control Dam, of the Army Corp of Engineers at rkm 31. The extent to which adult shad migrate up and utilize this lower reach is unknown. There is no shad habitat upstream of this barrier.

4.1.12.1 Agencies with regulatory authority:

The State of Vermont has legal authorities regarding dams and fish passage and the U. S. Fish and Wildlife Service and National Marine Fisheries Service work as needed on fish passage and protection issues at USACOE Projects. There are no plans for this Dam relative to shad.

4.1.12.2 Goal/Target:

All shad habitat, estimated as 139.5 ha, is accessible in this tributary. An annual minimum run of 15,485 shad is the target for this tributary.

4.1.12.3 Progress:

There are no identified needs for shad fish passage at this time.

4.1.12.4 Timeline:

Not applicable.

4.2 Threat: Hydropower Dam and Hydropower Facility Impoundment and Discharge Fluctuations and Operations

4.2.1 Recommended Action:

The operation of hydropower facilities includes peaking operations (sub-daily) at all noted power facilities, with the single exception of the Holyoke Dam/Hadley Falls Project (modified run-of-river), which can result in substantial alterations to river discharge (timing, frequency, magnitude, duration) downstream of the facilities as well as upstream (e.g., impounding periods and the operation of NMPS). These situations may impact persistent shad habitat, quantity, and quality at a sub-hourly time scale and a daily basis. An inventory and assessment of all hydropower facilities that are not required to operate as "run-of-the-river" should be identified and evaluated for the extent and types of impacts that may affect shad habitat. This should occur on both the mainstem river and identified tributaries. The FERC relicensing process for the five identified mainstem hydropower projects included studies to determine shad spawning locations, habitat features, and operational effects on these spawning activity (Normandeau, 2017) (FLP, 2016). Changes in the quantity of habitat for species including shad based on model information for shad spawning and juveniles were also examined under dual flow (peaking operations) for a range of paired flows for Bellows Falls and Vernon projects. Study results suggest occurrences of wide- ranging sub-daily changes in flows result in changes to shad habitat (specifically project minimum discharge conditions) with modeled high peaking (based on dual flow analyses). These model results were complicated at Vernon Dam by additional downstream hydropower operations of NMPS and/or Turners Falls Project operations that were outside the scope of the study (Normandeau , 2019).

4.2.2 Agencies with regulatory authority:

The States have legal authorities regarding dams and hydropower operation through FERC, Water Quality Certification (401) and Coastal Zone Management Act, as applies. The U. S. Fish and

Wildlife Service and National Marine Fisheries Service have authority through the Federal Power Act. Fish and Wildlife Coordination Act. and the Endangered Species Act, for designated species such as Dwarf Wedge Mussel, Puritan Tiger Beetle and Shortnose Sturgeon in the Connecticut River. Both PTB and SNS have been shown to be affected by flow re-regulation and help support the position that wide ranging, rapid flow fluctuations, at a sub-daily level are conditions that may affect species habitat use and behavior at important times in life history.

4.2.3 Goal/Target:

The State and Federal agencies will seek to develop and implement measures to reduce or mitigate any documented impacts of water use (e.g., sub daily peaking generation) on shad spawning and nursery habitat based upon available information. A natural flow regime, or increased inflow equal to outflow, to the extent possible, is preferred to better represent river conditions the species evolved with.

4.2.4 Progress:

The FERC relicensing process resulted in planned studies to examine project operation discharge effects on identified shad spawning habitat and behavior below Turners Falls Dam, in the Turners Falls impoundment, below the Vernon Dam, in the Vernon Dam impoundment, and below the Bellows Falls Dam. Those studies have been submitted with State and Federal agency comment letters. Great River Hydro initiated project operations discussion with the agencies in 2020 that led to the proposed operational schedule GRH submitted in their AFLA, that reduces peaking operations in the spring through the fall with increased frequency of inflow equals outflow at projects. The agencies believe the reduction in flow re-regulation, as proposed, will be a significant improvement from the existing peaking operations at the Wilder, Bellows Falls, and Vernon facilities that will benefit American Shad and their habitat use (e.g., migration, spawning, nursery).

4.2.5 Timeline:

The FERC has received the "requested additional information" that was asked of FirstLight Power, partly on GRH's proposed operational schedule that calls for less flow re-regulation (except in winter months) in June 2021. The agencies, companies and other parties are awaiting FERC's review for completeness of the submission. Should FERC determine they now have all necessary information to proceed (from FLP and GRH) they will issue a ready for environmental analyses which will trigger the agencies time window to submit their passage and protection measures along with habitat recommendations.

4.3 Threat: Water Withdrawal

4.3.1 Recommended Action:

An inventory and assessment of all permitted water withdrawals from the mainstem and targeted tributary shad habitat should be conducted using state agency permit data. At this time, there are water withdrawals for cooling water intake structures permitted by appropriate state and or federal agencies from the mainstem river. A partial list of mainstem water diversion permits includes from upstream to downstream: West Springfield Generation Station, MA (fossil fuels); Algonquin Power, Windsor, CT (natural gas); South Meadow Plant, Hartford, CT (fossil), GenConn, Middletown, CT (natural gas/fossil), and others. Information on Water Diversion Permits can be found on individual agency websites. In addition, the NMPS facility in Northfield, MA has a pumping capacity, to its storage reservoir, of up to 15,000 cubic feet per second, and is regulated by the FERC. Pumping duration is a function of the storage reservoir's water level and number of pumps used to refill which may vary on a variety of operational factors. The FLP Pre-Application

Document to FERC (2021) states "*In the summer and winter seasons, the NMPS typically peaks twice a day – in the morning and late afternoon. During other months, commonly called shoulder months, the NMPS may be peaked one to two times a day, pending electrical demand and/or price*." The potential pumping capacity of that plant at full operational capacity, is greater than the mean monthly river discharge for eight months of the year (refer to USGS 01170500 Montague Gage data).

Water withdrawals also occur in tributaries and should also be reviewed for potential impacts to habitat. Details of the type and extent of water withdrawal and subsequent discharge for these plants and others that remain to be collectively examined should be reviewed for potential impacts to American Shad habitat and potential population impacts. Considering climate change and associated changes in precipitation (i.e., timing, magnitude) water withdrawals should be examined, and or managed more closely.

Measures to either prevent or significantly reduce entrainment of eggs, early life stages and juveniles should be considered for commercial river water users.

4.3.2 Agencies with regulatory authority:

Regulatory authority for the withdrawal of water is under State authorities and/or legislation and in some instances the Environmental Protection Agency. In the case of the NMPS facility, licensed through FERC, both the Massachusetts and the federal resources agencies have specific authorities. Massachusetts DEP also has authorities related to water quality and plant operations.

4.3.3 Goal/Target:

The State and Federal agencies will seek to develop and implement measures to reduce documented impacts of water withdrawals on early life stages and outmigrants (e.g., entrainment and/or impingement) through available regulatory or other mechanisms.

4.3.4 Progress:

The Vermont Yankee Nuclear Power Station (Vernon, VT) and Mount Tom Coal Power Station (Holyoke, MA) were closed in 2014. Inventory of water withdrawals remains a management task by the fishery agencies relative to American shad and river herring habitat.

4.3.5 Timeline:

Monitoring of permit reports, permitting and other regulatory oversight by the states and federal agencies as applicable is ongoing.

4.4 Threat: Thermal Discharge

4.4.1 Recommended Action:

An inventory and assessment of all permitted thermal discharges from the mainstem and targeted tributary shad habitat should be conducted using state agency permit data as well as data from the Environmental Protection Agency (EPA) which has responsibility for the National Pollutant Discharge Elimination System (NPDES) and/or its delegation to approved State agencies, to varying levels. Permitted water withdrawals and discharge for cooling water intake structures occur on the mainstem river, from upstream to downstream, West Springfield Generation Station, MA (fossil); Algonquin Power, Windsor, CT (natural gas); South Meadow Plant, Hartford, CT (fossil); GenConn, Middletown, CT (natural gas/fossil); and others.

4.4.2 Agencies with regulatory authority:

NPDES authority has been delegated by the EPA to the states of Connecticut and Vermont. Whereas, the Commonwealth of Massachusetts and the State of New Hampshire have not been delegated authority and work with the EPA to issue NPDES permits.

4.4.3 Goal/Target:

Goals and targets vary among regulatory agencies. A NPDES permit will generally specify an acceptable level of a pollutant or pollutant parameter in a discharge (e.g., water temperature). The permittee may choose which technologies to use to achieve that level. Some permits, however, do contain certain generic 'best management practices'. NPDES permits make sure that a state's mandatory standards for clean water and the federal minimums are being met.

4.4.4 Progress:

Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters since passage of this law in 1972. An inventory of NPDES permitted thermal discharges, remains to be considered as a management task by the fishery agencies relative to American shad and river herring habitat in this basin. The EPA maintains a national website of NPDES permits (https://www.epa.gov/npdes-permits).

4.4.4.1 Timeline:

The Clean Water Act limits the length of NPDES permits to five years. NPDES permits can be renewed (reissued) at any time after the permit holder applies. In addition, NPDES permits can be administratively extended if the facility reapplies more than 180 days before the permit expires, and EPA or the state regulatory agency, which ever issued the original permit, agrees to extend the permit.

4.5 Threat: Water Quality

4.5.1 Recommended Action:

State and Federal agencies should regularly assess water quality monitoring data to ensure water quality does not become impaired and to support recommendations on proposed activities that may affect water quality. Significant water treatment improvement projects are under way for the City of Hartford, CT (https://www.thecleanwaterproject.com/) and Springfield, MA (https://waterandsewer.org/wp-content/uploads/2020/02/IntegratedWastewaterPlan.pdf), with the intent of better handling high pulse rain events that in the past required the dumping of untreated waste water from road run-off (combined sewer overflow). This work can also address related threats from Climate Change due to expected expected increased high intensity, shorter duration rain events. Other strategies to improve water quality and enhance climate change resiliency include maintaining forested riparian zones and stream banks, improving stormwater treatments, and installing compatible stream crossing infrastructure such as appropriately sized culverts.

Physical, chemical, and biological monitoring of water quality should be adequately supported, primarily through existing State agency authorities, by designated agencies, to ensure sufficient temporal and spatial coverage, sampling design, and sampling intensity. Classification standards and data among the four basin states should be coordinated and shared along with necessary monitoring measures. Communication between professional fishery agency staff and water quality staff should continue to be strengthened.

4.5.2 Agencies with regulatory authority:
The Clean Water Act of 1972 is the foundation for surface water quality protection in the United States. Sections of this Act provide direction on standards to the states. The states of Vermont, New Hampshire, Massachusetts, and Connecticut all maintain surface water monitoring programs.

4.5.3 Goal/Target:
Varies by authorizing agency and standards cannot be weaker than federal identified designations. The State of New Hampshire designates the mainstem as Class B. The State of Vermont classifies the mainstem as Class B and as coldwater fish habitat. The Commonwealth of Massachusetts designates the mainstem as Class B and as warmwater fishery habitat. The State of Connecticut also classifies the mainstem and tributaries as Class B. Standards associated with these designations are available on respective state agency web sites.

4.5.4 Progress:
Water quality on the mainstem and tributaries are monitored directly by respective state agencies, federal agencies (e.g., U. S. Geological Survey) non-profit watershed groups, power companies and others. State agency water quality monitoring web sites include: Connecticut https://portal.ct.gov/DEEP/Water/Inland-Water-Monitoring/River-and-Stream-Water-Quality-Monitoring, for Massachusetts https://www.mass.gov/guides/water-quality-monitoring, for New Hampshire https://www.des.nh.gov/water/rivers-and-lakes/river-and-lake-monitoring, and for Vermont https://dec.vermont.gov/watershed/map/monitor#River%20Programs.

4.5.5 Timeline:
State agency monitoring for standard assessments is ongoing as are other programs including USGS gauge stations with water quality instrumentation.

4.6 Threat: Land Use

4.6.1 Recommended Action:
State, Federal, and local governments should continue to support existing protective measures to address poor land use practices that may affect shad habitat either directly or indirectly. These measures may occur at multiple levels of government as noted. Riparian zone vegetation protection and bank protection are examples of concerns that insufficient land use (e.g., agriculture, residential, commercial uses) regulation or enforcement may result in degraded habitat and impact water quality. In some jurisdiction local Conservation Commissions can enact or expand buffer or "no-disturb zones" adjacent to riverbanks and other wetland resources (e.g., Commonwealth of Massachusetts River Protection Act (1996) and Wetland Protection Act (2014)). States should work in collaboration to develop and support consistent regulations and enforcement measures.

4.6.2 Agencies with regulatory authority:
Land use regulatory authority may reside at the local, state and/or federal government level.

4.6.3 Goal/Target:
The codification of rules and adequate enforcement to provide riparian vegetation protection and bank protection/stability and address other potential negatively impacting land use activities will help protect aquatic habitats.

4.6.4 Progress:
Status of existing state and local government rules are not summarized here. Examples of measures that have improved protections for land in Massachusetts include local Conservation Commissions

and DEP use of the Rivers Protection Act and Wetlands Protection Act to protect riparian and wetland habitats. Act 250, is Vermont's land use and development law, enacted in 1970.

4.6.5 Timeline:
Ongoing.

4.7 Threat: Climate Change

4.7.1 Recommended Action:
State and Federal agencies should identify data of value in the detection and monitoring for climate change effects on shad habitat and associated shad population dynamics or other responses (e.g., run timing) and whether those changes can successfully be adapted to by those populations. Sources of data (fishway counts, tagging studies) should be evaluated for ongoing value and whether any modifications may be necessary. Data that would be of value in this effort and are not being regularly collected (e.g., tagging studies) should be identified and developed by the State and Federal agencies as determined necessary. In freshwater, the timing, frequency, and magnitude of river discharge should be evaluated at regular intervals (spring run-off, droughts, pulse events) and related to fishery data including, but not limited to, fishway operational schedules, fish movement and behavior data, spawning success, habitats, and juvenile recruitment and outmigration. In the near-shore and marine environment, monitoring, and studies to assess shifts in conditions and habitats (e.g., water temperatures, currents, food sources, predators) should occur at regular intervals. The ASMFC 2020 American Shad Benchmark Stock Assessment and Peer Review provides modeling analyses that shows reduced growth rates and maximum size with increase sea surface temperatures (ASMFC, 2020). Additional work to understand climate change effects in freshwater and estuarine habitats on life history events and/or population level effects should also be examined.

Efforts to improve climate change resiliency should be pursued. Strategies should be developed and implemented to reduce stressors associated with climate change including drought, floods and increasing temperatures. Disaster management, urban planning, and river restoration are some strategies that can help mitigate the impacts of climate change.

4.7.2 Agencies with regulatory authority:
Regulatory authorities for climate change are not clearly in place currently. However, both State and Federal resources agencies have recognized the need to incorporate the reality of climate change as physical scientists work to develop future scenarios on effects (e.g., temperature regimes, river discharge, rainfall, snowpack) that may to varying degrees, affect species occurrence, population viability, and habitat quantity and quality.

4.7.3 Goal/Target:
It will be desirable to understand any trends in population metrics or other parameters, and any linked climate change drivers that may affect population structure, distribution, abundance, and viability. The resource agencies will seek to improve climate change resiliency and reduce other anthropogenic impacts that may exacerbate these impacts. Ultimately the agencies will seek to ensure the full restoration and long-term sustainability of this population given it is not at the extreme end of its distribution range.

4.7.4 Progress:
New or updated federal resource plans are required to include climate change.

4.7.5 Timeline:
Ongoing.

4.8 Threat: Invasive Species

4.8.1 Recommended Action:
Invasive aquatic plant species are increasing in occurrences and expanding their range within the Connecticut River basin, impacting native aquatic plant species and habitats (https://portal.ct.gov/DEEP/Fishing/General-Information/Aquatic-Invasive-Species). Eurasian water milfoil, water chestnut and most recent hydrilla have been expanding in the mainstem as well as in tributary and coves, primarily in Connecticut and Massachusetts. State agencies have been working to monitor the locations and extent of these invasive plants and work with partners on mitigation measures including pulling of plants before they go to seed. This highly labor-intensive approach includes federal agency assistance and NGOs. Boat launches in all basin states have signage explaining the issues with these invasive plant introductions, establishment, and expansion. Launches are also sometime staffed by agency representatives or volunteers that also interact to help ensure "clean, drain, dry" measures are used when trailering boats. Other invasive organisms not yet present (documented) of potential concern include range expansions of Asian mussel species (e.g., Zebra Mussel) and other organisms that have demonstrated detrimental impacts when introduced in other aquatic systems (e.g., Blue Catfish, Snakehead).

4.8.2 Agencies with regulatory authority:
State agencies have developed statutes that forbid the importation of the previously list plants and many other non-natives, with associated fines. Similarly, there are regulations requiring boaters' clean trailers or be subject to fines. Importation bans for certain identified species occur at the Federal and State level.

4.8.3 Goal/Target:
Measures that can help prevent either the direct or indirect introduction on non-native species should continue to focus on outreach and education. The development and implementation of safe and effective measure to reduce the rate of spread, or other mitigation measures should continue to be explored and evaluated.

4.8.4 Progress:
State agencies have increased efforts on education and outreach with boaters and anglers. Partnerships to manage certain areas (pulling of plants) have been developing. Aquatic Nuisance Species funding at the Federal level has been increasing in recent years due to the extent of this problem. These funds are used primarily by state agencies and have increased monitoring, assessment, and planning activities.

4.8.5 Timeline:
This work is ongoing and steadily expanding.

5 Habitat Restoration Program

Since the submission of the first plan in 2014 the following progress on both dam removals and technical fishway construction has occurred in both Connecticut and Massachusetts (Table 5). There are some other potential projects that are in early stages of development that would benefit American Shad habitat. The removal of the lower Collinsville Dam (Canton) on the Farmington River would restore shad habitat to the upper Collinsville Dam that is in final stages of upstream and downstream passage construction. The lower dam is owned by the state and has removal

design plans in place currently. The agencies and partners will continue work on restoring shad habitat and habitat accessibility, including barrier removal.

Table 5. Descriptions of American Shad habitat access improvements since the first submitted Plan.

State	System	Activity	Outcome
Connecticut	Mattabesset River	Kensington Dam, steepass ladder install	Access to an additional 2 km of habitat
Connecticut	Scantic River	Removal of Springborn Dam	Access to an additional 4 km of habitat
Massachusetts	Manhan River	Completion of Easthampton Dam Denil fish ladder	Access to approximately 18 km of habitat

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APPENDIX 1.

Annual American shad fish passage counts from 1980 through 2020 for the Holyoke Dam (MA), Turners Falls Dam (MA), Vernon Dam (VT), Farmington River (CT) and Westfield River (MA). These data are influenced by changing environmental conditions (e.g., spill), facility operations, and identification of issues with improvements to fishways (e.g., 2012 at Vernon Ladder).

Year	Holyoke Dam	Turners Falls Dam Passed	TF % of Holyoke Total	Vernon Dam Passed	Vernon % of TF Total	Farmington River, Rainbow Dam Passed	Westfield River, W. Springfield Dam Passed
1980	376,066	298	0%			480	
1981	377,124	200	0%	97	49%		
1982	294,842	11	0%	9	82%	737	
1983	528,185	12,705	2%	2,597	20%	1,565	
1984	496,884	4,333	1%	335	8%	2,289	
1985	487,158	3,855	1%	833	22%	1,042	
1986	352,122	17,858	5%	982	5%	1,206	
1987	276,835	18,959	7%	3,459	18%	792	
1988	294,158	15,787	5%	1,370	9%	378	
1989	354,180	9,511	3%	2,953	31%	215	
1990	363,725	27,908	8%	10,894	39%	432	
1991	523,153	54,656	10%	37,197	68%	591	
1992	721,764	60,089	8%	31,155	52%	793	
1993	340,431	10,221	3%	3,652	36%	460	
1994	181,038	3,729	2%	2,681	72%	250	
1995	190,295	18,369	10%	15,771	86%	246	
1996	276,289	16,192	6%	18,844	116%	668	1,413
1997	299,448	9,216	3%	7,384	80%	421	1,012
1998	315,810	10,527	3%	7,289	69%	262	2,292
1999	193,780	6,751	3%	5,097	75%	70	2,668
2000	225,042	2,590	1%	1,548	60%	283	3,558
2001	273,206	1,540	1%	1,744	113%	153	4,720
2002	374,534	2,870	1%	356	12%	110	2,762
2003	286,814		0%	268		76	1,957
2004	191,555	2,192	1%	653	30%	123	913
2005	116,511	1,581	1%	167	11%	8	1,237
2006	154,745	1,810	1%	133	7%	73	1,534
2007	158,807	2,248	1%	65	3%	156	4,497
2008	153,109	4,000	3%	271	7%	89	3,212
2009	160,649	3,813	2%	16	0%	35	1,395
2010	164,439	16,422	10%	290	2%	548	3,449
2011	244,177	16,798	7%	46	0%	267	5,029
2012	490,431	26,727	5%	10,386	39%	174	10,300
2013	392,967	35,293	9%	18,220	52%	84	4,900
2014	370,506	39,914	11%	27,706	69%	536	4,787
2015	412,656	58,079	14%	39,771	68%	316	3,383
2016	385,930	54,069	14%	35,513	66%	141	5,940
2017	537,249	48,727	9%	28,682	59%	615	6,000
2018	275,232	43,146	16%	31,724	74%	341	5,752
2019	314,353	22,575	7%	12,862	57%	276	4,064
2020	362,423	41,252	11%	13,897	34%	510	5,549
Mean	324,113	18,171		9,423		445	3,693
SD	130,732	18,436		12,356		450	2,154
Low	116,511	11		9		8	913
High	721,764	60,089		39,771		2,289	10,300

American Shad Habitat Plan for the Merrimack River

Merrimack River Anadromous Fish Restoration Program

Massachusetts Division of Fisheries and Wildlife
Massachusetts Division of Marine Fisheries
New Hampshire Fish and Game Department
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March 25, 2022

Table of Contents

1 INTRODUCTION

The Atlantic States Marine Fisheries Commission's (ASMFC) Amendment 3 to the American Shad and River Herring Fishery Management Plan (FMP) requires all states to submit a Habitat Plan for shad stocks in their jurisdiction. This is the first Shad Habitat Plan submitted for the Merrimack River. During reviews of the first round of habitat plans, the ASMFC requested a collaborative effort on larger, multi-jurisdictional river plans such as the Merrimack River. Diadromous fish management on the Merrimack River is conducted by the Merrimack River Anadromous Fish Restoration Program (MRAFRP), which was formalized by the Merrimack River Anadromous Fish Restoration Program Strategic Plan and Status Review in 1997 and whose membership included representatives from The United States Fish and Wildlife Service (USFWS), United States Forest Service, NOAA – National Marine Fisheries Service (NMFS), New Hampshire Fish and Game Department (NHFG), Massachusetts Division of Fisheries and Wildlife (MADFW), and Massachusetts Division of Marine Fisheries (MADMF). As is the case in many coastal states, in-state jurisdiction for American Shad is shared by the marine and freshwater agencies, here MADFW and MADMF.

The MADMF has included the Merrimack River in previous American Shad Sustainable Fishery Management Plans (SFMP) for that state but not in the prior American Shad Habitat Plan (Chase et al. 2021). The prior MA American shad SFMP that included a 3 fish per day harvest limit for recreational anglers with no commercial harvest permitted (Sheppard and Chase, 2018). New Hampshire does not currently permit harvest in the portion of the river within that state and does not currently have an American Shad SFMP for any state water.

Shad management is a collaborative effort between state and federal agencies and other partners. The overarching goal established by the Merrimack River Technical Committee(MRTC) is to restore a self-sustaining annual migration of American shad to the Merrimack River watershed, with unrestricted access to all spawning and juvenile rearing habitat throughout the mainstem of river and its major tributaries (MRTC 2010). The MRAFRP, mainly through efforts by the MRTC, has served as the lead in obtaining both upstream and downstream passage measures at mainstem dams and in coordinating state and federal agencies, commercial river users, and other partners on management topics for this species. Prior to the installation of fish passage facilities at the Essex Dam in Lawrence, MA, in 1983 and the Pawtucket Dam in Lowell, MA, in 1986, the restoration plan for American shad focused on collecting shad eggs from Connecticut River adults. From 1969 to 1978 over 25 million eggs were transported and seeded into various Merrimack River locations (MRTC 1997). By 1979, the stocking effort transitioned from seeding eggs to transporting adult shad from the Connecticut River. Connecticut River adult shad translocation continued until 1996. By the mid-1990s the restoration effort shifted from out of basin transfers to collecting adult shad at the Essex Dam fish lift and releasing them at several upriver locations. Since 2009, a portion of the adult shad captured at Essex Dam are transported to the USFWS Fish Hatchery at Nashua, NH. At the hatchery, adults are spawned and fertilized eggs are cared for until they hatch. The larvae, at about 10 days old, are released upstream from the Merrimack mainstem dams near Boscawen, NH. Recently, some larvae have also been released in the Nashua River, a tributary to the Merrimack River.

Following nearly three decades of attempted restoration, the MRTC developed *A Plan for the Restoration of American Shad Merrimack River Watershed* in 2010 (MRTC 2010). This plan laid a blueprint for restoration in the watershed but was not accepted by the ASMFC as a Habitat Plan or SFMP. Most recently, the MRTC completed the Merrimack River Watershed

Comprehensive Plan for Diadromous Fishes (MRWCP), which was approved by the MRAFRP Policy Committee in the winter of 2021 and subsequently filed with and approved by the Federal Energy Regulatory Commission (FERC) as a Comprehensive Management Plan later in that year. The plan was created by representatives from USFWS, NOAA, and the member state agencies and comprises up to date information on passage and restoration potential for multiple diadromous species across the entire watershed. Restoration potential was characterized by the estimated number of fish that a habitat would be able to produce and the MRTC created priority tiers to guide future work and set near- and long-term goals. Full details for all data sources, analyses, and prioritization can be found in the Comprehensive Plan.

2 HABITAT ASSESSMENT

The Merrimack River drains the fourth largest watershed in New England. Encompassing 8,060 square kilometers (km) and containing over 15,288 river km, the majority (approximately 75%) of the drainage is in NH; the remainder is in MA (Figure 1). The Merrimack River flows 186 km from the confluence of the Pemigewasset and Winnipesaukee Rivers in Franklin, NH to where the river meets the Atlantic Ocean near Plum Island in Newburyport, MA. Many of the river's upper tributaries are high gradient with some originating above 1,220 meters (m) in the White Mountains of NH. The mainstem of the Merrimack is a mild gradient falling 76 m from its origin to tidewater. The tidal influence extends many river kilometers (rkm) inland with the head of tide generally falling between rkm 33 and 35 near Haverhill, MA (Hartwell 1970). There are nearly 3,000 documented dams in the watershed, a clear reminder of the industrial impacts and human influence on the river. In addition to dams, there are numerous other barriers or potential barriers to diadromy, in the form of crossings, culverts, and natural features. Nearly 2.6 million people live in communities in or partially in the watershed, with over 500,000 residents utilizing the river as a primary source for drinking water.

Prior to colonization, waterfalls and natural sluices found at Pawtucket Falls (rkm 69), Amoskeag Falls (rkm 119), and the outlet of Lake Winnipesaukee, were important fishing grounds among Native Americans, and later among European settlers. These natural obstacles were a challenge for all diadromous fish, and likely impassible for some. They served to concentrate the fish attempting to swim upstream, increasing their vulnerability to capture and harvest. Still, prior to the advent of mainstem dams, remarkable numbers of fish migrated to their natal tributaries, lakes, and ponds. Some accounts indicate American shad reliably reached the outlet of Lake Winnipesaukee where they were harvested in great numbers (Meader 1869).

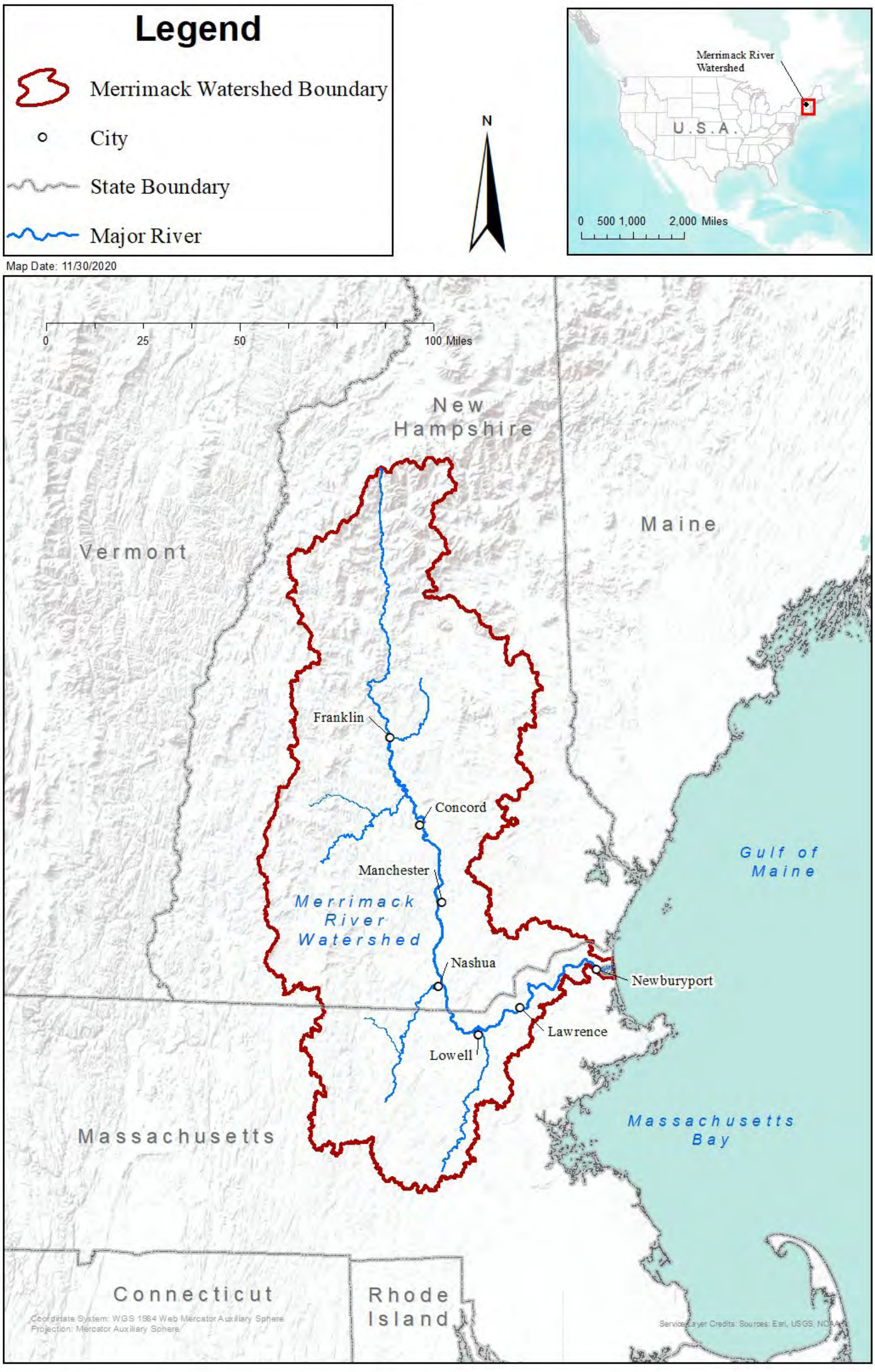

Figure 1. Merrimack River Watershed Overview

The historical American shad distribution in the Merrimack River Watershed included the entire mainstem (Table 1). In addition, major tributaries such as the Concord, Nashua, and Winnipesaukee Rivers supported runs of shad extending as far as Lake Winnipesaukee (Figure 2). Spawning occurred in Lake Winnipesaukee and in suitable areas on the mainstem and major tributary rivers. Livermore Falls, a natural barrier on the Pemigewasset, was likely the northern extent of shad distribution in the watershed. The construction of the Essex Dam in Lawrence, MA (ca. 1847) effectively eliminated the shad run with only a small remnant population persisting below the dam (MRTC 2010). Early attempts to create fish passage on mainstem dams were ineffective. When Essex and Pawtucket Dams were redeveloped in the 1980s with more contemporary fish passage structures, the population began to rebound after stocking. The present-day range ends at Hooksett Dam on the mainstem Merrimack River and at Talbot Mills Dam and Pepperell Dam on the Concord and Nashua rivers, respectively. Spawning habitat is limited to areas with fish passage on the Merrimack River, MRTC (2010) summarizes current and potential nursery habitats in the mainstem and major tributaries.

Table 1. Mainstem dams on the Merrimack River from rkm 0 upriver to the junction of the Winnipesaukee and Pemigewasset Rivers at rkm 186.

Barrier	River Km	Designated Extent of Upstream Impoundment/Habitat Break (rkm)	Purpose	Status
Essex Dam, Lawrence, MA	48	64	Hydroelectric power	Active, with fishways
Pawtucket Dam, Lowell, MA	70	106	Hydroelectric power	Active, with fishways
Amoskeag Dam, Manchester, NH	119	130	Hydroelectric power	Active, with fishways
Hooksett Dam, Hooksett, NH	132	140	Hydroelectric power	Active, without fishways
Garvin's Falls Dam, Concord, NH	140	153	Hydroelectric power	Active, without fishways

For this assessment, we have considered habitat in the context of the mainstem and tributary barriers that have fragmented, eliminated, or reduced access and altered habitat conditions throughout the basin (Figure 2). According to a recent analysis (MRTC 2021), there are over 7,729 lotic surface hectares of American shad habitat in the Merrimack River watershed with 2,914 (38%) of these hectares currently accessible. In the accessible reaches, passage inefficiencies due to poor facility design or seasonal flow regimes limit restoration goals and improvements must be made through FERC processes and engagement with dam owners.

During the initial diadromous fish restoration efforts on the Merrimack River, USFWS (Kuzmeskus et al. 1982) surveyed water depths and substrate composition. These surveys were used to identify appropriate shad spawning and nursery habitat in all sections of the mainstem Merrimack River and in many larger tributaries. This work was completed roughly 50 years ago

and it is important to note that shad spawning habitat located upstream of dam impoundments on both the mainstem and identified tributaries are subject to shifting (over space and time) with changing river discharge (Greene et al., 2009). Given the lack of consistency in geographically limited habitat assessments, we are currently unable to quantify habitat designations at a fine scale.

Historic and, in some cases, current American shad distribution include one tributary in the MA, one that runs through MA and NH, and six in NH (Figure 2, Table 3). Habitat information is based on the best information available which often is based on a limited qualitative assessment. It is important to note that it is difficult to categorize what type of habitats may have existed in the natural river channel beneath current dam impoundments.

Table 2. The estimated spawning and rearing habitat for American shad, by tributary in relation to estimated minimum annual adult shad production or return potential for tributaries (100 fish/acre = 247 fish/ha).

Tributary	Total rkm of Habitat	Area (estimated) ha	Adult Shad Return or Production
Concord, MA	59.5	367.1	90,673
Nashua, MA/NH	27.9	342.8	84,672
Souhegan, NH	32.2	30.4	7,509
Piscataquog, NH	11.3	82.2	20,300
Suncook, NH*	35.3	46.9	11,605
Soucook, NH*	39.6	25.9	6,401
Contoocook, NH*	20.6	383.6	94,792
Total			315,887

*Area estimates for these rivers from MRTC 1997; all others from MRTC 2021

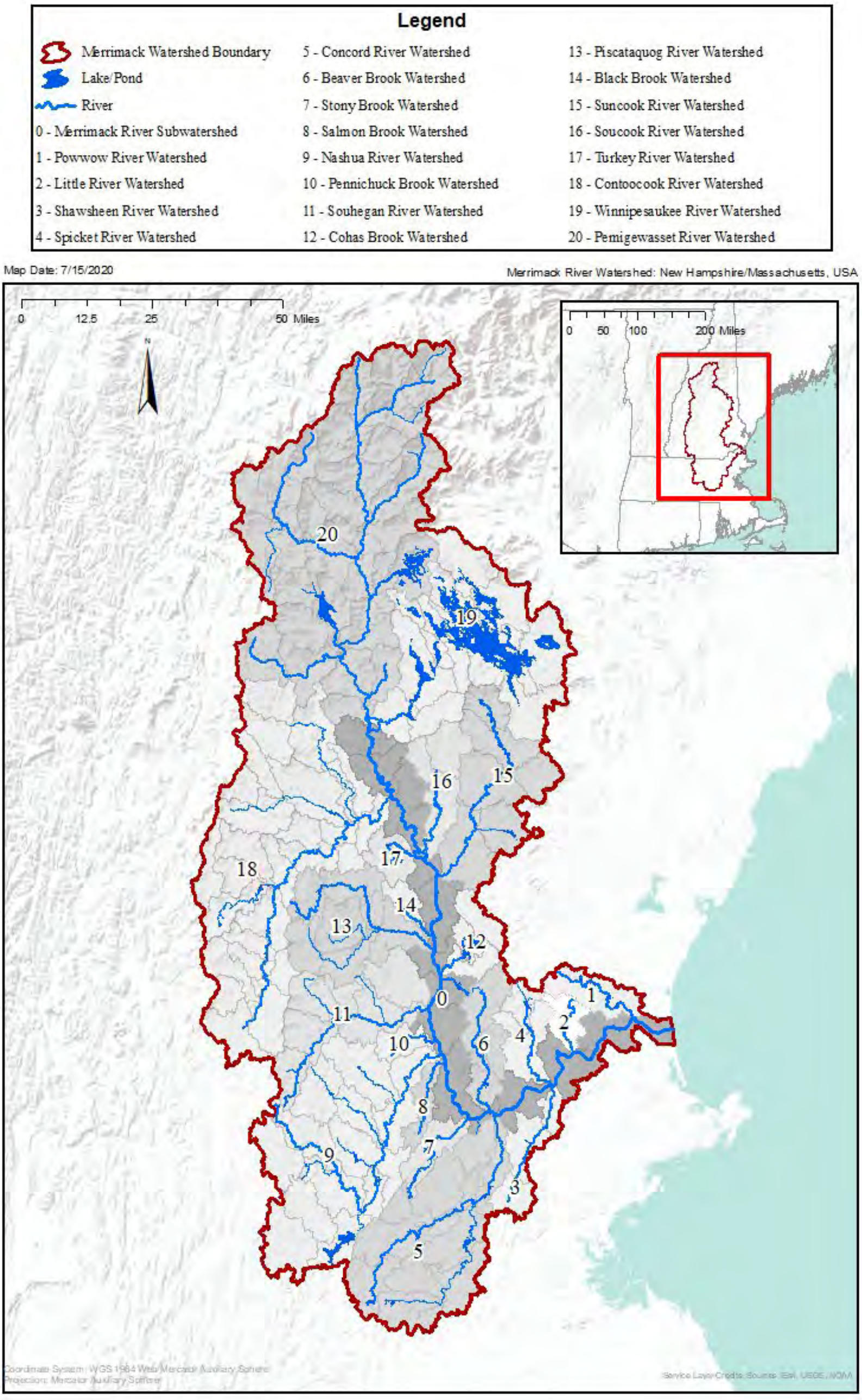

Figure 2. Sub-watersheds of the Merrimack River

3 HABITAT ACCESSIBILITY

Due to early colonization and an industrial history, the Merrimack River watershed has a high concentration of barriers; there are around 3,000 dams in various states of use and disrepair (Figure 3). Stream crossings, such as bridges and culverts, make up an additional 4,450 potential barriers. Keeping a current list of the condition and degree of all this infrastructure is daunting and there is no definitive data source. Because crossings and barriers are numerous throughout the watershed, we focused on the sites that limit passage along shad migration routes.

Adult shad have varied degrees of access to mainstem habitat up to the Hooksett Dam at rkm 132 (NH) using a fish lift system at the Essex Dam (MA), a fish lift or vertical slot fishway at Pawtucket Dam (MA), and a modified pool and weir fish ladder at the Amoskeag Dam (NH; Table 4). Upstream fish passage efficiency remains a major concern and has been demonstrated to vary widely among these mainstem facilities, with the Pawtucket Dam fish lift and Amoskeag ladder identified as having low to very low passage efficiencies. Annual shad passage counts at the Pawtucket Dam facilities have averaged 16.9% (range: 4.6% - 48%) of the number of shad passed at the downstream Essex Dam, with the highest value occurring in 2018 after the operator and MRTC agreed to open the bypass reach vertical slot ladder at Pawtucket for the entire passage season (MRTC 2021). Until recent modifications, the ladder at Amoskeag effectively blocked all shad migration. Following MRTC-directed modifications, American shad passage has been documented but overall efficiency is still unknown. Downstream passage at all facilities is varied and little is known about routing or survival (Table 3).

Table 3. Passage summary for dams on the mainstem Merrimack River

Dam	Upstream Passage Type	Upstream Passage Location	Downstream Passage
Essex Dam Lawrence, MA	Fish Lift	Power house	Surface bypass
Pawtucket Dam Lowell, MA	Fish Lift	Power house	Surface bypass
	Vertical slot ladder	Bypass reach	
Amoskeag Dam, Manchester, NH	Pool and weir	Power house	Surface bypass
Hooksett Dam, Hooksett, NH	Designed rock ramp	-	Surface bypass
Garvin's Falls Dam, Concord NH	None	-	Low-level and surface bypasses

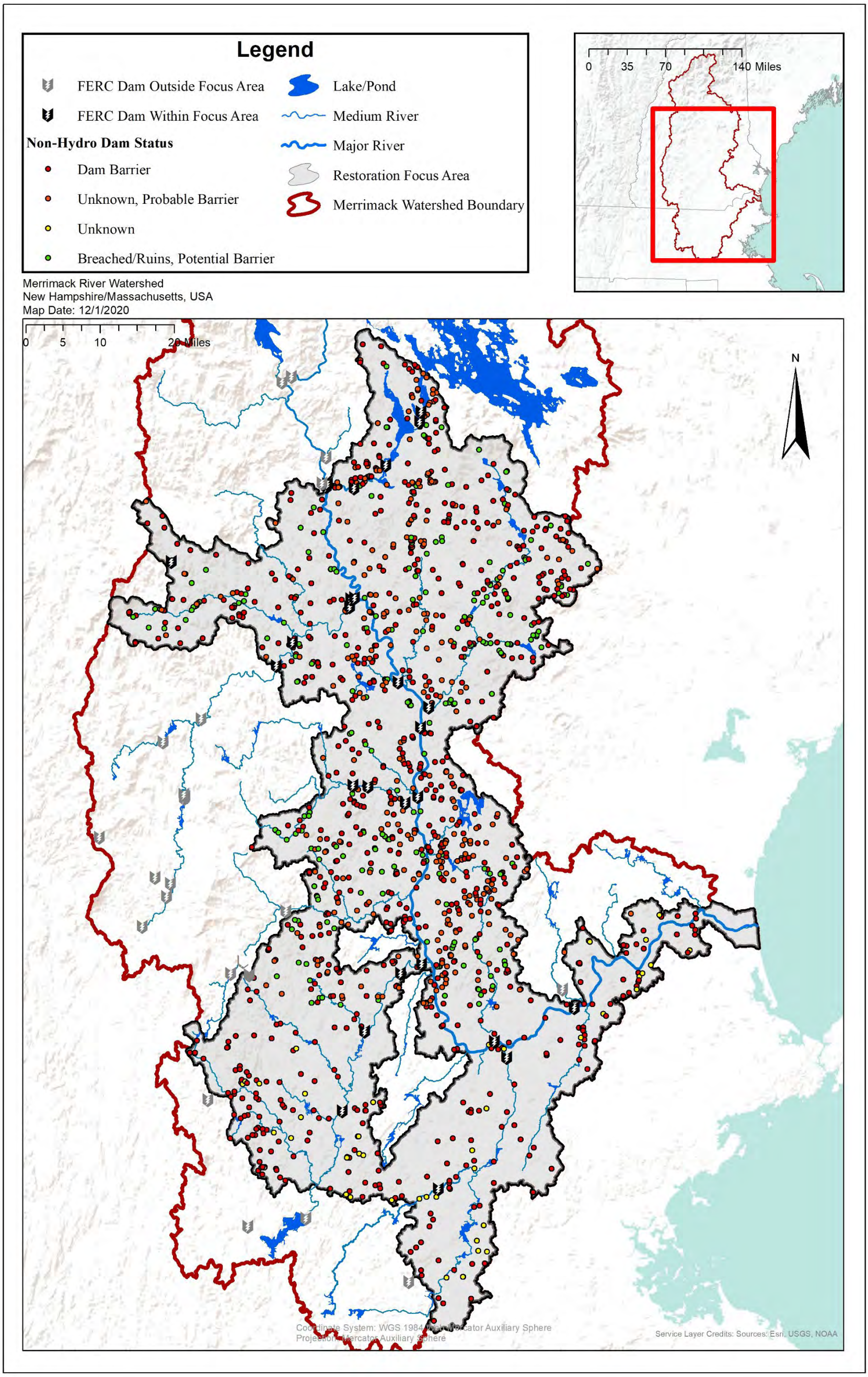

Figure 3. Barriers in the Merrimack Watershed

The only facility with informative American shad efficiency data is the Pawtucket Dam. Sprankle (2005) radio tagged American shad and found that 9% of tagged fish that approached the Pawtucket dam were able to locate and pass the fish lift. Hogan et al. (2011) used fine scale 2D and 3D modelling of tagged shad to determine that the tailrace flow field appeared to obstruct shad from locating the fish lift entrance and documented an overall efficiency of 7%. Normandeau Associates examined both up and downstream passage as part of the Initial Study Report process for the Lowell FERC Relicensing (Boott Hydro, 2020). This study confirmed extremely low efficiency at the fish lift with 43 tagged shad making 201 unique attempts to enter the forebay and pass the lift with only 37% of those attempts reaching the lift entrance and only 6% of the total events leading to passage through the lift. Cormack Jolly Seber model results yielded an overall effectiveness estimate of 30.4% (75% CI = 22.1 – 39.5%). Only two tagged fish were detected at the bypass ladder, neither of which passed. In the same study Normandeau examined downstream delay and survival of adult American shad. They found a median delay at the dam of 3.9 days for tagged shad with a range of 0.4 hours to 20.0 days. However, 30% of tagged shad passed in fewer than 24 hours and 51% passed in fewer than 96 hours. Tagged shad that approached the Project used all available routes with 26% going through the turbines, 28% using the sluice bypass, and 38% using the bypassed reach. However, tagged fish did not appear to exhibit equal survival among routes with 89% of fish using the bypassed reach, 82% of fish that used the bypass sluice, and 35% of fish that went through the turbines successfully arriving downstream at the Essex Dam. Cormack Jolly Seber models estimated that 70.0% (75% CI = 64.5 – 74.6%) of adult American shad survived downstream passage at the facility.

The 2020 American Shad Benchmark Stock Assessment and Peer Review Report provides a comprehensive review of the many issues with fish passage for adult and juvenile shad on both upstream and downstream passage measures (ASMFC 2020). The Report also contains a modeling analysis to quantify losses of both habitat and adult production from dams that strongly support the need to have substantial improvements in the "performance" of fishways related to percentage rate of passage success, time to pass (delay issues), and survival from passage. These passage metrics must also be considered in their cumulative effects given fragmentations of habitat by dams in rivers within the Merrimack watershed. The need for improved achievable passage performance criteria is well supported along with additional fish behavior research and fish passage engineering (USFWS, 2019).

Distances to and type of available passage at first barrier are noted in Table 4 along with the status of the next barrier. As is the case on the mainstem, fish passage efficiency is poorly understood at dam fishways in tributaries. On the Concord River, observations at Middlesex Falls, under multiple flows, has led to the conclusion that the breached area should be passable. However, no formal testing or rigorous monitoring has occurred. Upstream at Centennial Falls Dam, the MRTC has documented many issues with the existing ladder[1] and are currently

[1] See 2017 inspection report, FERC Accession # 20171019-5023

working with the dam owner to create a new upstream passage facility rather than attempt to repair the current Denil ladder. Volunteer monitoring on the Nashua River has not documented any shad passing at Jackson Mills or Mine Falls during the past few years of monitoring; therefore, the effectiveness of the Denil ladder at Jackson Mills for shad is unknown, as well as at the fish lift at Mine Falls. An inventory of all potential fish passage obstructions was compiled in the MRWCP (2021). The subset of obstructions relevant to American shad passage can be found in Appendix 1 to this Habitat Plan and in the related Barrier Inventory submitted with the Plan.

Table 2. Identified American shad tributaries of the Merrimack River basin with first, second, and third (where applicable) dam locations and status of passage.

Tributary	Distance to 1st Upstream Dam (rkm)	First Dam	US/DS Passage Provided by	2nd Dam (rkm)	US/DS Passage Provided by	3rd Barrier (rkm) and Notes
Concord	0.64	Middlesex Falls	breach	Centennial (2.2)	Denil/sluice	Talbot Mills (8), ongoing removal FS
Nashua	2	Jackson Mills	Denil/bypass pipe	Mine Falls (8.4)	lift/ surface bypass	Pepperell (22.9), Existing triggers
Souhegan	22.5	McLane	- /-	Goldman (22.9)	-/-	Pine Valley (32.2)
Piscataquog	3.2	Kelley's Falls	-/sluice	Gregg's Falls (11.3)	-/ surface bypass	Hadley Falls (13.8)
Suncook	0.8	China Mill	- /-	Webster (.95)	-/-	Pembroke (1.4)
Soucook	30.9	Loudon Village Dam	-/-			
Contoocook	0.5	Penacook Lower Falls	-/modified gate	Penacook Upper Falls (1.5)	-/-	Rolfe Canal (3.4)

4 THREATS ASSESSMENT

4.1 Threat: Barriers to Migration Upstream and Downstream

4.1.1 Recommended Action

One of the primary goals of the Merrimack River Comprehensive Plan (MRTC 2021) was to:

> "Restore a self-sustaining American shad population in the Merrimack River watershed, with unrestricted access to spawning and juvenile rearing habitat throughout the mainstem and major tributaries."

The MRTC's analysis identified 7 dams currently blocking more than 1,400 hectares of habitat on the Mainstem, Concord, Nashua, Souhegan and Piscataquog Rivers (Table 5; Figure 4). Fish passage at these seven dams will nearly double the accessible diadromous fish spawning and

rearing habitat (termed the “Interim Plan”). Moreover, fish passage or dam removal, depending on the site, is a realistic or expected outcome for many or all dams within the next decade. Pursuing the MRWCP’s interim plan is the Recommended Action to mitigate the Barrier to Migration threat.

Passage at these sites should have a large positive effect on American shad production. Potential production for alosines was estimated based on available spawning habitat under different accessibility scenarios and an expectation of 247 shad being produced for every hectare of habitat (MRTC 2010, MDMR and MDIFW 2016). American shad production potential (defined as adult fish returning to the river mouth) in accessible habitat above Essex Dam is currently 421,900 returning adult fish (Table 6). Under the Recommended Action, the production increases to 780,200 as a result of the increased access to habitat, which is just over half the estimated production of 1,446,200 adult shad if all barriers in the watershed had passage. The Recommended Action estimates a large increase in both available habitat and potential production of American shad with successful engagement at the seven dams listed in Table 6. It is vital to note that other diadromous species such as blueback herring, alewife, American eel, and sea lamprey will benefit from fish passage improvements at any dam structure in the watershed.

Table 5. List of dams where implementation of fish passage is recommended by 2030

FERC Project - #	Dam Name	State	Waterway	License Expiration Date	Hectares of Habitat Blocked
1893	Garvin Falls	NH	Merrimack River	4/30/2047	609.5
1893	Hooksett	NH	Merrimack River	4/30/2047	224.6
3025	Kelley's Falls	NH	Piscataquog River	3/31/2024	82.2
12721	Pepperell	MA	Nashua River	8/31/2055	176.0
Non-Hydro	Talbot Mills	MA	Concord River	N/A	327.4
Non-Hydro	McLane	NH	Souhegan	N/A	< 2
Non-Hydro	Goldman	NH	Souhegan	N/A	30.4

Table 6. Potential production of American shad under different habitat scenarios (scenarios only consider habitat upstream of Essex Dam)

Habitat Scenario	Hectares of Habitat	Potential # of Returning Adult American Shad
Current Scenario	1,707	421,900
Recommended Action	*1,450*	*358,300*
Total (Current + Recommended)	3,157	780,200
Ideal Scenario	14,462	1,446,200

Notably, the 2020 American Shad benchmark Stock Assessment and Peer Review Report (ASMFC, 2020) and connected modeling efforts (Stich et al 2019, Zydlewski et al 2021) have provided evidence that high survival and minimal delay during both upstream and downstream

migration are essential to sustainable shad stocks in dammed rivers. Accordingly, the MRWCP established the following Passage Performance Criteria:

- For alosines, achieve and maintain a minimum of 80 percent upstream passage efficiency.
- For alosines and American eel, achieve and maintain a minimum of 95 percent downstream passage survival.
- Ensure diadromous passage facilities do not cause unnecessary delay that exceeds 24 hours at each Project.

These criteria also make the multiple hydroelectric project licenses that expire by 2030 priorities for the MRTC. These include projects on the mainstem Merrimack River and Nashua River where improving efficiency and effectiveness of existing facilities is the focus, as well as projects on the Contoocook and Piscataquog Rivers where no passage facilities currently exist (Table 7). While the Suncook, Soucook, and Contoocook Rivers are not within the Recommended Action, information on Fish Passage and Habitat Access are included below as restoration opportunities are likely to occur within the next decade.

Table 7. Hydroelectric facilities with expiring licenses before 2030; MRTC agencies will actively participate in the licensing processes.

FERC Project - #	Facility Name	Facility Owner	Waterway	License Expiration Date
2790	Lowell	Central Rivers Power	Merrimack River	4/30/2023
3442	Mine Falls	City of Nashua	Nashua River	7/31/2023
3025	Kelley's Falls	Green Mountain Power	Piscataquog River	3/31/2024
3342	Penacook Lower	Briar Hydro Associates	Contoocook River	11/30/2024
3240	Rolfe Canal	Briar Hydro Associates	Contoocook River	11/30/2024
6689	Penacook Upper	Briar Hydro Associates	Contoocook River	11/30/2024
2800	Lawrence	Central Rivers Power	Merrimack River	11/30/2028

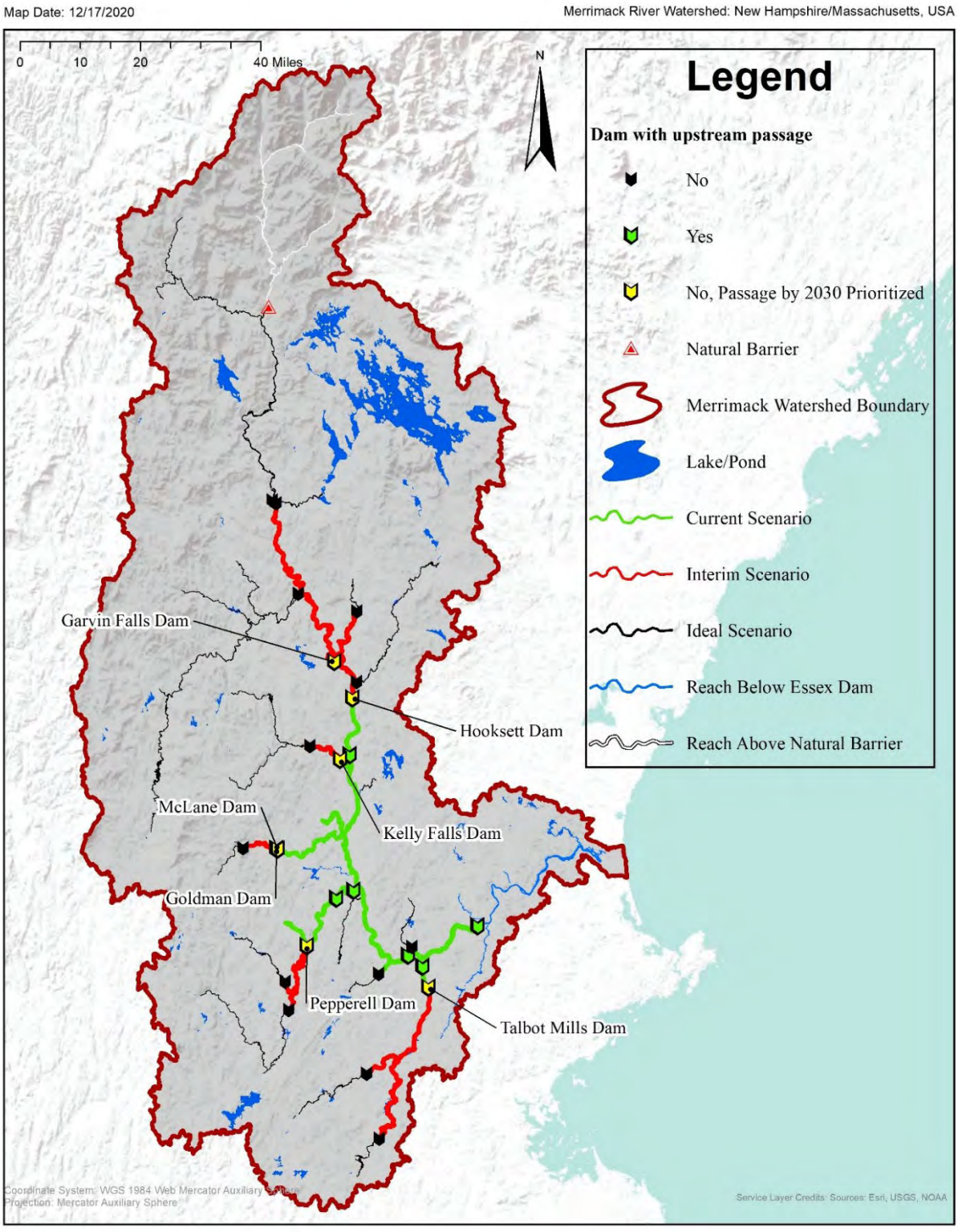

Figure 4. Current and Potential Diadromous Fish Access, Merrimack River Watershed

4.1.2 Fish passage/habitat access mainstem Merrimack River (MA, NH)

The first barrier on the mainstem of the Merrimack River is the Essex Dam, which spans the river at rkm 48.3 approximately 12.9 km above the head of tide. Originally named the Great Stone Dam, the Essex Company finished construction in 1848. At 274.3-meters-long and 10-meters-tall, it was the largest dam in the world at that time. The dam was designed to divert water into two power canals for textile manufacturing. The dam is now used for hydroelectric power generation. The dam impounds a 15.8-km-long, 265.1-hectare reservoir with a storage capacity of roughly 19,900 acre-feet. The original license for the Lawrence Hydroelectric Project was issued by the FERC in 1978 to Lawrence Hydroelectric Associates and Essex Company with an authorized capacity of 16.8 MW. The project was operational by 1981 using two Kaplan turbine units, each rated at 7.4 MW, to generate electricity resulting in an installed capacity of 14.8 MW. The original license included mandatory conditions for the construction and operation of a fish lift and a downstream bypass sluice.

Essex Company is still the licensee, but the project has transferred ownership to Central Rivers Power. Recently the project was upgraded with an automatic crest gate system to better control impoundment levels. In addition, the FERC amended the license to remove the historic canals from the project boundary. The project will begin licensing in 2023, with the original license set to expire in 2028. As the first mainstem barrier, the outcomes of this licensing will determine the future success of diadromous fish restoration in the Merrimack watershed. The MRTC will take an active approach in the licensing process to ensure effective fish passage structures support diadromous fish restoration goals.

The Pawtucket Dam is the second dam on the Merrimack River constructed on Pawtucket Falls at rkm 69.2 in Lowell, MA. Constructed in 1847, the dam originally provided hydropower through the network of associated canals to run America’s first large-scale planned industrial city. At 333-meter-long and 4.6-meter-tall, the stone- masonry gravity dam is one of the largest in the Merrimack watershed. The dam impounds the river 37 km upstream, with a surface area of 291.4 hectares and a capacity of 3,960 acre-feet of water storage. The dam was recently upgraded with an automatic crest gate system to better control the impoundment water level. The dam currently diverts water to a main hydroelectric development (E.L. Field Powerhouse) with two Kaplan units (17.3 MW) and four other hydropower developments located in the downtown canals with a myriad of antiquated turbine units. The total project authorized capacity is 24.8 MW. Boott Hydropower, LLC obtained the original license in April of 1983. The project is presently undergoing licensing with the original license set to expire on April 30, 2023. In the draft license application, the Licensee has proposed decommissioning the developments in the downtown canal system. Boott Hydropower, LLC remains the licensee, but ownership of the project has recently transferred from Enel Green Power to Central Rivers Power.

The Pawtucket dam has several fish passage facilities that began operation in 1986: a fish ladder at the north end of the dam, a fish lift at the power station, a downstream bypass in the power canal, a temporary eel trap at the north end of the dam, and fish counting stations at each upstream passage facility. Many of these fish passage measures are ineffective and challenging infrastructure combined with a lack of downstream entrainment prevention for out-migrating fish causes reduced passage, increased migratory delay, and high project-induced mortality. Fish passage improvements are necessary at Lowell to meet the management goals of the MRWCP (MRTC 2021).

The Merrimack River Project consists of three developments on the mainstem, Amoskeag, Hooksett, and Garvin's Falls. The three developments have a combined installed capacity of 29.9 MW. The dams are located along a 33.8-km stretch of the upper Merrimack in New Hampshire's Hillsborough and Merrimack Counties, near Manchester, Hooksett, and Concord respectively. The original license was issued to the Public Service Company of New Hampshire in 1980, and the project was issued a new license in 2007. Central Rivers Power operates the facilities under the current license set to expire in 2047.

Amoskeag Development (Manchester, NH)

Constructed on the site of the historic Amoskeag Falls, Amoskeag Dam impounds the river at rkm 119.1 in Manchester, NH. Originally constructed in the 1830s to provide hydropower for the mills of the Amoskeag Manufacturing Company; the dam was re-built in the 1920s for hydroelectric power generation. The 8.8-meter-tall, 216.4-meter-long dam impounds a 11.3-km reach of the mainstem with a surface area of 193.4 hectares. The powerhouse contains three Francis turbine units with a total installed capacity of 16 MW. Fish passage facilities were put into operation in 1989. The fishway facilities include a pool and weir fish ladder, multiple eel traps, and a downstream bypass system at the powerhouse waste gate. A trap and trucking station is part of the ladder allowing adult fish to be collected for stocking. Because the fish ladder was designed for Atlantic salmon, the effectiveness for other diadromous fish has been poor. However, recent modifications to the ladder have shown promise for alosines. With no entrainment prevention at the powerhouse, safe downstream passage at the development remains a concern.

Hooksett Development (Hooksett, NH)

The Hooksett hydroelectric facility is the fourth dam on the Merrimack River, located north of the town of Hooksett at rkm 132. The 14-meter-high dam comprises two sections: a 103.6-meter stone masonry section on the western half of the river connected to a 76.2-meter concrete section to the east. The dam creates a 8.9-km, 163.9-hectare reservoir. The powerhouse contains a single vertical propeller turbine with 1.6 MW of installed capacity. Hooksett Dam has no upstream fish passage structures. However, a requirement for upstream passage facilities is included in a settlement agreement for the Merrimack Project. Construction of a rock ramp fishway at the western spillway is anticipated the summer of 2022 or 2023. Gate structures next to the powerhouse are used for downstream passage with minimal success. With no entrainment prevention at the powerhouse, safe downstream passage at the development remains a concern.

Garvin's Falls Development (Concord, NH)

Garvin's Falls is the fifth and final dam on the Merrimack mainstem located 8 kilometers upstream of Hooksett at rkm 140. The 5.5-meter-high, 167.6-meter-long dam is made of granite and concrete. The 259-hectare impoundment created by the dam is 12.9-kilometers-long. The two powerhouses each contain two Kaplan/propeller generating units that have a total installed capacity of 12.3 MW. Like Hooksett, there are no anadromous upstream fish passage measures at Garvin's Falls. However, there are seasonal eel traps installed at the development. Provisions for future fishways are contained in the 2007 settlement agreement. A louver-type downstream fish guidance and bypass system is present in the 152.4-meter-long power canal. Since the cessation of the Atlantic salmon program in the Merrimack River, the louver is no longer installed in the power canal, but the bypass system still operates to pass American eel and

stocked alosines. With no entrainment prevention at the powerhouse, safe downstream passage at the development remains a concern.

4.1.2.1 Agencies with regulatory authority:
The MRTC, while an ad hoc committee, regularly interacts and completes agreements with dam owners and hydropower operators that are then confirmed by the member agencies. The individual States have their independent authorities related to diadromous fish passage and management The USFWS and NMFS have fishway prescription authority through the Federal Power Act, used in connection with FERC.

4.1.2.2 Goal/Target:
The Merrimack River Watershed Comprehensive Plan (2021) includes goals and objectives that are quantified in terms of the entire population as well as within the river basin's many segmented habitat reaches. Adult population targets are described as targets based on biological data and accessible habitat for the targeted reach described in that plan. Target populations are based on a minimum of 80%-effective upstream passage at all projects.

4.1.2.3 Progress:
The relicensing process for the Essex Dam Project will begin in 2023 and the MRTC expects to achieve modifications to the project that will allow for the goals in the MRWCP and this habitat plan to be met. FERC relicensing is ongoing for the Pawtucket Dam Project and the agencies expect that new upstream and downstream passage measures will be implemented as part of that process with construction occurring between 2024 and 2026. Over the past 5 passage seasons fishway engineers with USFWS and NMFS have worked with the hydropower operators to make improvements to the ladder at the Amoskeag Development, leading to improved passage of alosines at that facility. At the Hooksett Development in New Hampshire, 90% design plans of a rock ramp fishway have been approved by the management agencies. The Licensee and MRTC have agreed on a timeline for providing passage and are currently discussing downstream mitigation measures. Upstream passage at Garvin's Falls will be triggered by passage numbers at Amoskeag and the construction of the Hooksett rock ramp fishway.[2]

4.1.2.4 Timeline:
The MRTC and Boott Hydropower, owner and licensee of the Lowell (Pawtucket Dam) Project, have reached an agreement in principal for upstream and downstream fish passage improvements to meet the goals of the MRWCP. This agreement is also reflected in Boott's final relicensing application currently pending before the FERC. The agreement must still be finalized and then submitted to and approved by FERC as part of its relicensing order. As design plans for a fishway at the Hooksett development have now been approved, MRTC is optimistic upstream passage will be available there by 2024. Currently the first 5 mainstem dams on the Merrimack are owned by one entity, Central Rivers Power, which may make achieving mainstem passage goals more feasible over the next decade.

4.1.3 Fish passage/habitat access Concord River (MA)

The Concord River has three obstacles to fish passage. Near the mouth of the Concord (0.64 km from the confluence with the Merrimack River), is the breached Middlesex Dam. This structure

[2] Passage of 9,800 American shad or 23,200 river herring at Hooksett OR 19,300 American shad or 45,800 river herring at Amoskeag.

is passable under normal flow conditions, though likely causes delays in migration. Another 1.6 km upstream is the Centennial Island Hydroelectric Project. Volitional passage is provided in the bypass reach via a fish ladder at the north end of the dam. Continuing approximately 4.8 km upstream is the Talbot Mills Dam, the final barrier on the Concord River mainstem. Talbot Mills Dam is a complete barrier to fish passage, except for American eel.[3] Removal of this dam will provide access to 56.3 km (299 hectares) of historical mainstem river habitat for diadromous fish in the upper Concord, and lower Assabet and Sudbury Rivers. The NOAA Fisheries Restoration Center, MADMF, and other partners are actively engaged with the owner of Talbot Mills Dam to remove the dam in the near future.

4.1.3.1 Agencies with regulatory authority:

At Centennial, the Commonwealth of Massachusetts has legal authorities regarding dams and fish passage and the USFWS and NMFS have authority through the Federal Power Act and through FERC for licensed hydropower dam/projects. The Commonwealth of Massachusetts has legal authorities regarding dams and fish passage at Talbot Mills.

4.1.3.2 Goal/Target:

The MRTC has a goal to confirm or improve passage at Middlesex Falls, improve poor up and downstream passage at Centennial Falls, and remove the Talbot Mills Dam.

4.1.3.3 Progress:

Members of the MRTC are planning to confirm passage at the breached Middlesex Falls and identify any further work that may be needed in the next 12 months. At Centennial Island, the MRTC is actively involved with the owner and hopes to implement a small nature-like fishway on river right to replace the poorly functioning existing Denil ladder on river left. The MRTC has also documented severe degradation of the downstream trash rack/fish exclusion structures by the dam and the owner has prioritized their replacement. In 2019 the owners agreed to pursue funding for removal and in early 2022 the Talbot Mills removal effort was chosen as a "Priority Project" by MA Division of Ecological Restoration, bringing additional expertise and funding to the team.

4.1.3.4 Timeline:

The Talbot Mills project is the only effort with a currently defined timeline. The most recent Scope of Work developed among project partners sets an aggressive target date for dam removal in the fall of 2023. While this date may not be met, removal in the next three years seems likely.

4.1.4 Fish passage/habitat access Nashua River (NH, MA)

The Nashua River watershed is the third largest in the Merrimack basin consisting of three distinct reaches. The North Nashua River flows 31 km southeast from the confluence of Whitman River and Philips Brook in Fitchburg, MA where it meets the Nashua River in Lancaster, MA. The South Nashua River flows 8.4 km north from the Wachusett Reservoir Dam outlet where it joins the North Nashua River. From here the Nashua River flows 60.5 km northeast into New Hampshire, where it flows into the Merrimack at rkm 87.7. There are over 1,609 km of rivers and streams in the 138,046-hectare watershed, including several impounded reaches. Because of flow diversion at the Wachusett Reservoir, the Nashua River watershed differs from its historical drainage. There are 178 lakes, ponds, and impoundments in the

[3] American eel have been documented above this dam, indicating that at least some individuals of this species are capable of scaling the dam under certain conditions. It is still a significant impediment for this species.

watershed with a total surface area of 4,351.2 hectares (10,756 acres). Two contiguous ponds in the watershed are identified by NHFG as suitable alewife stocking habitat; Flints Pond (20.2 hectares) and Potanipo Pond (55 hectares). Major tributaries in the watershed include the Quinapoxet, Stillwater, Squannacook, and Nissitissit Rivers.

The first dam on the Nashua River is the Jackson Mills Dam, which impounds the river 2 km upstream from the confluence with the Merrimack in the city of Nashua, NH. The stone masonry gravity dam was constructed in 1920, with the hydropower facility coming into operation in the mid-1980s. The run-of-river facility consists of a 54.9-meter-long dam, 10.1 meter in height including a 2.4-meter-high automatic crest gate. The dam impounds a 16.0-hectare reservoir with negligible usable storage capacity. The installed capacity of the project is 1.0 MW generated by a single propeller turbine in the powerhouse at the north end of the dam. The Exemptee is planning to replace the existing unit with a Kaplan turbine. The project has a license exemption issued in 1984 to the City of Nashua, NH.

As a condition of the license exemption, the Exemptee was required to install fish passage facilities. Both upstream and downstream passage structures are in place, with a Denil fish ladder for upstream passage, and a stainless-steel bypass pipe for fish migrating downstream. Observational evidence and recent site inspections suggest the current fish ladder needs improvements, although no studies have been conducted to confirm. As Jackson Mills is the first dam on the river, effective fish passage is vital for the success of diadromous fish in the Nashua River watershed. The Exemptee has recently agreed to replace the upstream passage facility and install full depth, ¾" exclusion racks to the downstream facility no later than 2030.

The second dam on the Nashua River is the Mine Falls hydroelectric project, located 6.4 km upstream of the Jackson Mills project in Nashua, NH. The hydropower facility is situated at the site of a 19th century dam and gatehouse. The dam once served to divert water, via a gatehouse, to a 10.7-meter-wide hand-dug power canal. The defunct canal flows 4.8 kilometers east, parallel to the Nashua River, to the former site of the Nashua Manufacturing Company textile mill. The dam impounds a 97.9-hectare reservoir with a usable storage capacity of 450 acre-feet. The water is routed through a 106.7-meter power canal to the powerhouse, which contains two Kaplan turbines with an authorized capacity of 3.0 MW. The original license was issued in 1983 to the City of Nashua and will expire in 2023.

Fish passage was prescribed in the original license to be implemented either by 1985 or upon completion of upstream passage facilities at the Pawtucket Dam. The upstream fish passage measure is a fish lift discharging fish into the power canal. While the presence of upstream passage facilities is beneficial, several improvements are needed to improve fish passage and survival. The current downstream bypass system is generally a safer route of passage though studies indicate a poor entrance efficiency. The existing upstream and downstream facilities will require modifications in the new license.

The Pepperell project is the third dam on the Nashua River 14.5 kilometers upstream of the Mine Falls project in Pepperell, MA. The 76.5-meter-long, 7.2-meter-tall Pepperell Paper Company Dam impounds a 5.6-kilometer-long, 119-hectare reservoir and provides water to the powerhouse via a 172.5-meter-long penstock. The project's three generating units combine for an installed capacity of 2.14 MW. The original 40-year license was issued to the Pepperell Hydro Company, LLC in 2015 and expires in 2055.

Currently there are no upstream fish passage structures, but the license contains numerous conditions (including minimum flow levels) for fish passage resulting from a settlement. The installation of upstream fish passage at Pepperell is required upon passage of 5,000 river herring during two consecutive years at the Mine Falls Project and this trigger may be met in 2022 as more than 5,000 herring were passed in 2021.[4] Downstream protections for alosines are required in the license. Full implementation of these fish passage measures is important as upstream fish passage improves at Mine Falls and Jackson Mills.

4.1.4.1 Agencies with regulatory authority:
Depending on the location of a specific Project, either the State of New Hampshire (Jackson Mills and Mine Falls) or the Commonwealth of Massachusetts (Pepperell) has legal authorities regarding dams and fish passage and the U. S. Fish and Wildlife Service and National Marine Fisheries Service have authority through the Federal Power Act and through FERC for licensed hydropower dam/projects.

4.1.4.2 Goal/Target:
Achieve goals and objectives defined in the MRWCP (2021). An annual minimum run of 58,700 shad is the target for this tributary.

4.1.4.3 Progress:
No shad passage has been documented in the Nashua River to date. Studies have been completed and the agencies are working with the City of Nashua to finalize a timeline for the completion of recommended fish passage improvements at Jackson Falls and Mines Falls.

4.1.4.4 Timeline:
The Exemptee and MRTC have developed a timeline in the revised amendment application, but FERC approval is still pending.

4.1.5 Fish passage/habitat access Souhegan River (NH)

At rkm 99.8 in the town of Merrimack, NH, the Souhegan River enters the Merrimack River from the west. The Souhegan flows 54.4 km from its source at the confluence of the south and west branches near New Ipswich, NH. The Souhegan River and tributaries total 657 river kilometers, draining the 56,980-hectare watershed. There are 42 lakes and ponds with a total surface area of 448 hectares (1,105 acres). Although a few dams have been removed from the lower river, many barriers remain, including four hydroelectric projects in the middle and upper reaches. Wildcat Falls is a natural feature approximately 2.0 miles upstream from the Souhegan mouth. During lower flow conditions, these falls are not considered a barrier for most diadromous fish.

About 22.5 km upstream of the Merrimack confluence, the McLane Dam impounds the Souhegan River. The 5.5-meter-tall, 54.9-meter-long stone masonry spillway was originally built in 1846 and was reconstructed with concrete in 1992. The McLane Dam serves no function and increases the risk of flooding to upstream properties. The dam blocks migration for both resident and diadromous fish.

[4] If the trigger is met in 2022, passage does not need to be implemented until 2026 per the settlement. The Licensee is currently discussing conceptual upstream passage designs with the MRTC.

Immediately downstream of the Route 13 Bridge (0.4 km above the McLane Dam), the Souhegan is impounded by the Goldman Dam. This dam was originally constructed in 1810 and rebuilt in the 1960s. The private trust-owned structure has a spillway of approximately 52.7 meters in length and a low-level outlet at the north end. Like the McLane Dam, Goldman Dam serves no function. Signs of aging, such as undermining of the concrete dam face, are visible. Passage at the McLane and Goldman Dams will open nearly four kilometers of historical diadromous fish habitat on the Souhegan River.

Further upstream, near rkm 32.2, Pine Valley Mills Dam is the third barrier on the Souhegan River. Constructed in 1912, the 61-meter-long, 7-meter-tall stone-masonry dam impounds a 2.8-hectare reservoir. Water is supplied to a turbine in the nearby powerhouse with a capacity of 0.525 MW.

The 40-year license was originally issued to Mr. Winslow H. MacDonald in 1987, and has since been transferred to PVC Commercial Center, LLC. The license will expire in September 2027. The project has a downstream bypass for fish. No upstream passage was required in the original license; however, there is a reservation of authority to require upstream passage at the project if Atlantic salmon were restored to the Souhegan. Upstream fish passage at the two non-hydro dams downstream is needed before migratory fish reach the Pine Valley Project.

4.1.5.1 Agencies with regulatory authority:
The State of New Hampshire has legal authorities regarding dams and fish passage and the USFWS and NMFS have authority through the Federal Power Act and through FERC for the licensed hydropower Pine Valley Dam.

4.1.5.2 Goal/Target:
Achieve goals and objectives defined in the MRTC CP (2021). An annual minimum run of 7,509 shad is the target for this tributary (Table 3).

4.1.5.3 Progress:
A feasibility study was done to evaluate the potential removal of the McLane and Goldman Dams, but the project did not move forward due to a lack of local support. Future attempts to provide fish passage should start by reengaging the town of Milford.

4.1.5.4 Timeline:
There is no developed timeline for actions on the Souhegan River

4.1.6 Fish passage/habitat access Piscataquog River (NH)

The Piscataquog River flows east for 59.5 km from Deering Reservoir in Deering, NH to the Merrimack downstream from the Amoskeag Dam in Manchester, NH at rkm 114.3 Numerous tributaries flow into the Piscataquog, with a combined length of over 624 km, and a drainage area of 56,202 hectares. There are 52 lakes and ponds (including four major impoundments) totaling 818.4 hectares (2,025 acres).

The first dam on the Piscataquog River is the Kelley's Falls Project 3.2 km upstream from the Merrimack confluence. The multi-section concrete gravity dam is 153.3 meter long and 9.4 meters tall, with the spillway comprising 58.5 meters of the total length with a height of 6.4 meters. The dam was constructed in 1916 and impounds a 52.2-hectare reservoir (Namaske Lake) with a storage capacity of 1,350 acre-feet. The powerhouse contains a turbine with a capacity of 0.45 MW. The original license was issued in 1984 with a 40-year term expiring on

March 31, 2024. The licensee is Kelley's Falls, LLC (a subsidiary of Green Mountain Power Corporation). MRTC member agencies are actively involved in the licensing process of this project.

Article 26 of the original license included the condition that the "Licensee shall provide upstream and downstream fish passage facilities within one year after completion of fish passage facilities at the downstream Lowell Project (P-2790)". Lowell's fish passage facilities came online in the mid-1980s. In 1987, the license was amended to require the approved upstream and permanent downstream passage in the second year following an annual upstream passage of 15,000 American shad at Amoskeag Dam. There are no upstream fish passage structures in place at the project; however, MRTC member agencies are seeking upstream fish passage at the project during the current relicensing period. The Licensee uses the existing log sluice as a bypass for stocked anadromous species, American eel, and resident species.

Gregg's Falls Dam is owned by the State of New Hampshire located at rkm 11.3 on the Piscataquog. The earthen-fill and concrete gravity dam is 414.5 meters long and 18.3 meters tall, impounding the 55.4-hectare reservoir known as Glen Lake. Glen Lake has a storage capacity of 3,650 acre-feet. The powerhouse contains two turbines with an installed capacity of 3.48 MW. A license exemption was issued for the project in 1983. Project ownership has changed hands since the original issuance, and the project is now operated by Eagle Creek Renewable Energy, LLC on lease from the State. The project has downstream passage installed for Atlantic salmon.

The third dam on the Piscataquog River is the Hadley Falls Project located at the western end of Glen Lake. The dam is 6.1 meters tall and approximately 91.4 meters in length including a 53.6-meter-long spillway that impounds a 9.7-hectare reservoir. The project is owned by the NH Department of Environmental Services and was operated by Algonquin Power & Utilities Corp with an authorized capacity of 0.25 MW under a license exemption that was issued in 1982. The run-of-river project no longer operates and is in a state of disrepair making it a candidate for decommissioning and removal.

4.1.6.1 Agencies with regulatory authority:
The State of New Hampshire has legal authorities regarding dams and fish passage and the U. S. Fish and Wildlife Service and National Marine Fisheries Service have authority through the Federal Power Act and through FERC for the for licensed hydropower dam/projects.

4.1.6.2 Goal/Target:
Achieve goals and objectives defined in the MRTC CP (2021). An annual minimum run of 20,300 shad is the target for this tributary (Table 2).

4.1.6.3 Progress:
Fish passage improvements are under discussion at Kelley's Falls as part of the relicensing process. The USFWS has reached an agreement with Eagle Creek regarding fish passage improvements at Gregg's Falls. The Hadley Falls Dam is under consideration for removal.

4.1.6.4 Timeline:
Ongoing.

4.1.7 Fish passage/habitat access Suncook River (NH)

There is a series of three dams in close proximity 0.8 km above the confluence with the Merrimack. The lowermost dam is the China Mill Project, a 1.7 MW facility not federally-regulated. The China Mill Dam is the first barrier on the Suncook River. The project does not

require a federal license because it began operation prior to the Federal Water Power Act (FWPA, 1920), and is therefore non-jurisdictional under the current FPA. The dam impounds the river and diverts water through a 365.8-meter-long power canal less than a kilometer upstream of the river mouth. The dam is roughly 46 meters in length and is a complete barrier to fish passage.

The other two dams comprise the Webster-Pembroke Project (P-3185). At the upstream end of the project, the Webster Dam forms the Suncook River Reservoir. The reservoir has a surface area of 10.5 hectares and a volume of 147 acre-feet. The partially removed, stone-masonry Pembroke Dam, located on the bypass reach about 549 meters downstream, receives the minimum flow release and spill from the Webster Dam. The run-of-river project was issued a license exemption in 1983 with an authorized capacity of 2.75 MW. There are no fish passage facilities at the project.

The Suncook River watershed is a priority because of the considerable amount of lentic spawning habitat in the river corridor. Although the non-jurisdictional status of the China Mill Project limits engagement, providing fish passage in the lower Suncook remains a priority.

4.1.7.1 Agencies with regulatory authority:
The State of New Hampshire has legal authorities regarding dams and fish passage and the U. S. Fish and Wildlife Service and National Marine Fisheries Service have authority through the Federal Power Act and through FERC for the for licensed hydropower dam/projects.

4.1.7.2 Goal/Target:
Provide upstream and downstream passage at the first three dams on the Suncook River. An annual minimum run of 11,605 shad is the target for this tributary (Table 2).

4.1.7.3 Progress:
Partial removal of the Pembroke Dam was an important step toward making the Suncook River accessible to anadromous species, but access will not be achieved until fish passage is provided at the China Mill Dam.

4.1.7.4 Timeline:
Ongoing.

4.1.8 Fish passage/habitat access Soucook River (NH)

The Soucook River flows 39.6 km south from the confluence of Bumfagen Brook and Gues Meadow Brook in Loudon, NH to the Merrimack at rkm 138.1 downstream from the Garvin's Falls Dam. In addition to the Soucook mainstem, over 230.1 km of tributaries drain the 23,569-hectare watershed. There are 21 lakes and ponds in the watershed with a total surface area of 297.8 hectares (734 acres). With no barriers present until rkm 30.9, the Soucook River is relatively free flowing compared to other rivers in the Merrimack basin, with only a few small dams in the upper watershed. While a smaller river, some reaches of the mainstem are suitable for blueback herring and American shad, but, with the exception of Fox Pond and Rocky Pond in the upper watershed, few contiguous lakes or impoundments offer suitable spawning habitat for alewife. Fish passage improvements made at the upper mainstem Merrimack dams (e.g., Hooksett Dam) will provide access to the Soucook watershed.

4.1.8.1 Agencies with regulatory authority:
The State of New Hampshire has legal authorities regarding dams and fish passage and the U. S. Fish and Wildlife Service and National Marine Fisheries Service have authority through the Federal Power Act and through FERC for the for licensed hydropower dam/projects.

4.1.8.2 Goal/Target:
Provide access to suitable habitat upstream of the Loudon Village Dam. An annual minimum run of 6,397 shad is the target for this tributary (Table 2).

4.1.8.3 Progress:
The Loudon Village Dam is not a hydropower project. Fish passage construction at this site will require outside sources of funding.

4.1.8.4 Timeline:
Ongoing.

4.1.9 Fish passage/habitat access Contoocook River (NH)

Originating from the combined outlet of Mountain Brook Reservoir, Pool Pond, and Contoocook Lake in Jaffrey, NH, the Contoocook River flows 119.1 km northeast to the Merrimack at rkm 161.4 in Penacook, NH. There are over 30 dams on the Contoocook mainstem, including 11 hydropower dams. The first three dams on the Contoocook River support hydropower generation facilities. All three projects are operated by Briar Hydro Associates and owned by Essex Hydro. These projects operate in a run-of-river mode but have a license condition to maintain a minimum flow of 338 cfs. The licensing process began in 2019. None of these dams have upstream fish passage structures for anadromous fish (Penacook Upper Falls Dam has an eel trap and lift).
The first dam on the Contoocook River, Penacook Lower Falls Dam, is located 0.5 kilometers upstream from the Merrimack. The dam is of recent construction compared to others in the Merrimack watershed, with the hydropower facility starting operation in 1983. The project, operated as a run-of-river facility, consists of approximately 213.4-meter-long dam with spillways at each end and a powerhouse at the downstream end of the north shore. The dam impounds a reservoir with a surface area of 3.4 hectares and a 54-acre-foot storage capacity. The authorized capacity of the project is 4.11 MW produced by a Kaplan turbine. At the time of the original license in 1982, upstream fish passage facilities were not required at the project because of numerous downstream dams without fish passage. A modified gate next to the project intake is operated for downstream passage of stocked anadromous fish and American eels.

The original license includes a provision for constructing fish passage structures within three years of the first passage at the next downstream dam – which was Sewall's Falls Dam at the time of licensing – now Garvin's Falls. Each mainstem dam below the Penacook Lower Falls Project will have fish passage facilities within the next decade. The installation of upstream fish passage is an important consideration for the new license issued for this project.

The Penacook Upper Falls Project is the second dam on the Contoocook and is 0.8 kilometers upstream from Penacook Lower Falls. The dam supports a power generation facility that came online in December 1986. The dam is 57 meters long, 4.7 meters tall impounding a 4.5-hectare reservoir with little storage capacity. A Kaplan turbine operates in the powerhouse at the east end of the dam, with an installed capacity of 2.8 MW. Like Penacook Lower Falls, fish passage was not required at the time of construction. However, a condition required fish passage facilities to be installed within one year of the completion of fish passage facilities at all downstream dams.

The installation of upstream fish passage is a necessary condition for the new license (the current license expires in 2024).

Less than a kilometer upstream from Penacook Upper Falls Dam, the Contoocook bifurcates into a shallow and wide main river corridor to the north and the project tailrace to the south. The two watercourses reconnect about a kilometer and a half further upstream. The Rolfe Canal Project, which received an original license in 1984, includes structures on both watercourses. Water is diverted into Rolfe Canal by the 91.4-meter-long, 3-meter-high York Dam. A 1,219-meter-long bypass reach extends below the dam with a license-required minimum flow of 100 cfs. The dam creates a reservoir with a surface area of around 20.2 hectares. The Rolfe Canal headgate structure is 213.4 meters from the bifurcation in the impoundment. Another 914 meters downstream from the headgates is a 39.6-meter-long, 5.2-meter-high granite block dam that feeds a 274.3-meter-long penstock leading to the powerhouse with a Kaplan turbine rated at 4.28 MW. The remainder of the Rolfe Canal has a minimum flow of 5 cfs that passes over the Briar Pipe dam and around the Briar Pipe apartments before discharging into the tailrace of the powerhouse.

As with the two Penacook Falls projects, fish passage facilities were not required initially due to lack of passage at downstream dams with the same provisions at the Penacook projects. Because the Rolfe Canal and Penacook projects have the same licensee (Briar-Hydro Associates) and owner (Essex Hydro), the FERC ordered these projects undergo licensing on the same timeline. Installing fish passage on these three projects is an important for meeting management goals in the watershed. The current license is set to expire on November 30, 2024.

4.1.9.1 Agencies with regulatory authority:

The State of New Hampshire has legal authorities regarding dams and fish passage and the USFWS and NMFS have authority through the Federal Power Act and through FERC for the for licensed hydropower dam/projects.

4.1.9.2 Goal/Target:

Provide upstream and downstream passage at the first three dams on the Contoocook River. An annual minimum run of 94,792 shad is the target for this tributary (Table 2)

4.1.9.3 Progress:

All three projects on the Contoocook River are currently undergoing FERC relicensing.

4.1.9.4 Timeline:

Ongoing.

4.2 Threat: Hydropower Facility Operations

4.2.1 Recommended Action:

There are currently 49 active hydroelectric projects comprising 57 developments (generating powerhouses) with a combined capacity of approximately 140 megawatts (MW) in the Merrimack River Watershed. Twenty-nine developments are exempt from licensing. Twenty-eight developments are operating with a license, ten of which will expire before 2030 (Figure 5). In New Hampshire and Massachusetts, two Licensees operate nearly 30% of the licensed hydroelectric projects: Central Rivers Power, LLC (CRP) and Eagle Creek Renewable Energy, LLC (a subsidiary of Ontario Power Generation). Other Licensees operating multiple dams in the watershed include Green Mountain Power Corporation, the City of Nashua, and Essex Hydro Associates, LLC. All hydropower dams in the Merrimack that have shad passage or are expected to in the near-term operate in run of river, rather than peaking, operation. Some dams in the upper watershed, notably on the Pemigewasset River, occasionally operate in a peak mode however the Merrimack almost always has a dampened but natural hydrograph. Apart from up and downstream passage issues discussed above, regulatory agencies should focus on impoundment management, minimum flow levels, and thermal effects from hydropower facilities.

4.2.2 Agencies with Regulatory Authority:

The States have legal authorities regarding dams and hydropower operation through FERC, Water Quality Certification (401) and Coastal Zone Management Act, as applies. The U. S. Fish and Wildlife Service and National Marine Fisheries Service have authority through the Federal Power Act and the Fish and Wildlife Coordination Act.

4.2.3 Goal/Target:

The state and federal agencies will seek to develop and implement measures to reduce or mitigate any documented impacts of water use (e.g., thermal degradation of habitat) on shad spawning and nursery habitat based upon available information.

4.2.4 Progress:

The FERC relicensing process is underway for the Pawtucket Falls Project (P-2790) and no significant impacts to American shad outside of passage have been discovered or discussed. Six other projects targeted by the MRTC are due for relicensing in the next decade and should be examined for any potential operation

4.2.5 Timeline:

Ongoing.

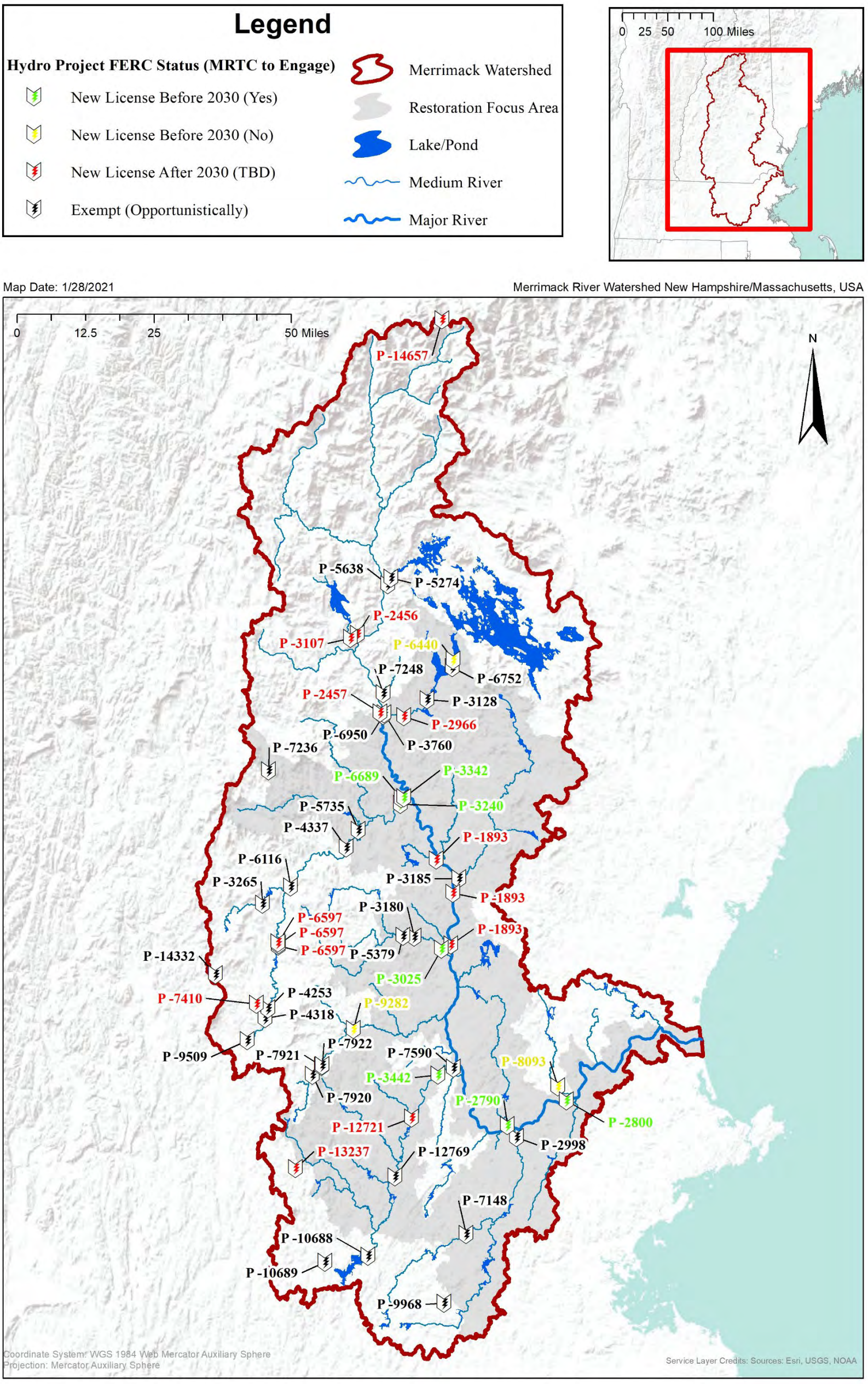

Figure 2. License Status and Distribution of Hydroelectric Projects in the Merrimack River Watershed

4.3 Threat: Water Withdrawal

4.3.1 Recommended Action:

An inventory and assessment of all permitted water withdrawals from the mainstem and targeted tributary shad habitat should be conducted using state agency permit data. At this time, there are water withdrawals for cooling water intake structures permitted by appropriate state and or federal agencies from the mainstem river. The only known large scale withdrawal permit is for the Merrimack Station, in Bow, NH (coal). While other large withdrawal permits have not been discovered, many smaller scale withdrawals are permitted and could have cumulative impacts at low flows. Information on Water Diversion Permits can be found on individual agency websites (e.g., NHDES).

Water withdrawals also occur in tributaries and should also be reviewed for potential impacts to habitat. Details of the type and extent of water withdrawal and subsequent discharge for these plants and others that remain to be collectively examined should be reviewed for potential impacts to American Shad habitat and potential population impacts. Considering climate change and associated changes in precipitation (i.e., timing, magnitude), evapotranspiration, and water withdrawals should be examined, and or managed more closely.

Measures to either prevent or significantly reduce entrainment of eggs, early life stages and juveniles should be considered for commercial river water users.

4.3.2 Agencies with regulatory authority:

Regulatory authority for the withdrawal of water is under State authorities and/or legislation and in some instances the Environmental Protection Agency.

4.3.3 Goal/Target:

The state and federal agencies will seek to develop and implement measures to reduce documented impacts of water withdrawals on early life stages and outmigrants (e.g., entrainment and/or impingement) through available regulatory or other mechanisms.

4.3.4 Progress:

None.

4.3.5 Timeline:

Monitoring of permit reports, permitting and other regulatory oversight by the states and federal agencies as applicable is ongoing.

4.4 Threat: Thermal Discharge

4.4.1 Recommended Action:

An inventory and assessment of all permitted thermal discharges from the mainstem and targeted tributary shad habitat should be conducted using state agency permit data as well as data from the Environmental Protection Agency (EPA) which has responsibility for the National Pollutant Discharge Elimination System (NPDES) and/or its delegation to approved State agencies, to varying levels. Permitted water withdrawals and discharge for cooling water intake structures occur at the Merrimack Station, in Bow, NH (coal).

4.4.2 Agencies with regulatory authority:

The Commonwealth of Massachusetts and the State of New Hampshire have not been delegated authority and work with the EPA to issue NPDES permits.

4.4.3 Goal/Target:

Goals and targets vary among regulatory agencies. A NPDES permit will generally specify an acceptable level of a pollutant or pollutant parameter in a discharge (e.g., water temperature). The permittee may choose which technologies to use to achieve that level. Some permits, however, do contain certain generic 'best management practices'. NPDES permits make sure that a state's mandatory standards for clean water and the federal minimums are being met.

4.4.4 Progress:

Industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters since passage of this law in 1972. An inventory of NPDES permitted thermal discharges, remains to be considered as a management task by the fishery agencies relative to American shad and river herring habitat in this basin. The EPA maintains a national website of NPDES permits (https://www.epa.gov/npdes-permits).

4.4.5 Timeline:

The Clean Water Act limits the length of NPDES permits to five years. NPDES permits can be renewed (reissued) at any time after the permit holder applies. In addition, NPDES permits can be administratively extended if the facility reapplies more than 180 days before the permit expires, and EPA or the state regulatory agency, which ever issued the original permit, agrees to extend the permit.

4.5 Threat: Water Quality

4.5.1 Recommended Action:

State and federal agencies should regularly assess water quality monitoring data to ensure water quality does not become impaired and to support recommendations on proposed activities that may affect water quality. Urban runoff, combined sewer overflows (CSOs), dam impacts, heated discharge from power plants, and historical sediment contaminants affect overall water quality in the Merrimack River. Contemporary reports indicate pathogens are the major water quality concern for the river, coming primarily from the combined effects of CSOs and urban runoff. CSOs remain in operation in six communities across the Merrimack watershed; Haverhill, Lawrence, Lowell, and Fitchburg (Nashua River) in Massachusetts, and Nashua, and Manchester in New Hampshire. Some historical pollutants are still a concern today with sediments containing high levels of mercury and other industrial pollutants. Atmospheric deposition of toxics is also a concern, and fish consumption advisories are in effect for much of the lower watershed as a result (Meek and Kennedy 2010). The majority of lotic waters in the historical range of the diadromous species in the Merrimack watershed are Class B or C (USACE 2006).

Physical, chemical, and biological monitoring of water quality should be adequately supported, primarily through existing State agency authorities, by designated agencies, to ensure sufficient temporal and spatial coverage, sampling design, and sampling intensity. Classification standards and data between New Hampshire and Massachusetts should be coordinated and shared along with necessary monitoring measures. Communication between professional fishery agency staff and water quality staff should continue to be strengthened.

4.5.2 Agencies with Regulatory Authority:

The Clean Water Act of 1972 is the foundation for surface water quality protection in the United States. Sections of this Act provide direction on standards to the states. The states of New Hampshire and Massachusetts maintain surface water monitoring programs.

4.5.3 Goal/Target:

Varies by authorizing agency but standards cannot be weaker than federal identified designations. The State of New Hampshire designates the mainstem as Class B. In Massachusetts, the Merrimack River is designated a Class B (inland) water from the NH border to Haverhill at Creek Brook, while the 35.4-km tidal section from Haverhill to the ocean is designated a Class SB (coastal and marine) water. Standards associated with these designations are available on respective state agency (i.e., DEP) web sites.

4.5.4 Progress:

Water quality on the mainstem and tributaries are monitored directly by respective state agencies, federal agencies (e.g., U. S. Geological Survey) non-profit watershed groups, power companies and others. State agency water quality monitoring web sites include: Massachusetts https://www.mass.gov/guides/water-quality-monitoring and for New Hampshire https://www.des.nh.gov/water/rivers-and-lakes/river-and-lake-monitoring. Monitoring data collected by the Merrimack River Watershed Council can be found at https://merrimack.org/science/water-quality-monitoring-program/.

4.5.5 Timeline:

State agency monitoring for standard assessments is ongoing as are other programs including USGS gauge stations with water quality instrumentation.

4.6 Threat: Land Use

4.6.1 Recommended Action:

State, federal, and local governments should continue to support existing protective measures to address poor land use practices that may affect shad habitat either directly or indirectly. These measures may occur at multiple levels of government as noted. Riparian zone vegetation protection and bank protection are examples of concerns that insufficient land use (e.g., agriculture, residential, commercial uses) regulation or enforcement may result in degraded habitat and impact water quality. In some jurisdictions, local Conservation Commissions can enact or expand buffer or "no-disturb zones" adjacent to riverbanks and other wetland resources (e.g., Commonwealth of Massachusetts River Protection Act (1996) and Wetland Protection Act (2014)). States should work in collaboration to develop and support consistent regulations and enforcement measures.

4.6.2 Agencies with Regulatory Authority:

Land use regulatory authority may reside at the local, state and/or federal government level.

4.6.3 Goal/Target:

The codification of rules and adequate enforcement to provide riparian vegetation protection and bank protection/stability and address other potential negatively impacting land use activities will help protect aquatic habitats.

4.6.4 Progress:
Status of existing state and local government rules are not summarized here. Examples of measures that have improved protections for land in Massachusetts include local Conservation Commissions and DEP use of the Rivers Protection Act and Wetlands Protection Act to protect riparian and wetland habitats.

4.6.5 Timeline
Ongoing.

4.7 Threat: Climate Change

4.7.1 Recommended Action:
State and federal agencies should identify data of value in the detection and monitoring for climate change effects on shad habitat and associated shad population dynamics or other responses (e.g., run timing) and whether those changes can successfully be adapted to by those populations. Sources of data (fishway counts, tagging studies) should be evaluated for ongoing value and to help determine whether any modifications may be necessary. Data that would be of value in this effort and are not being regularly collected (e.g., tagging studies) should be identified and developed by the state and federal agencies as determined necessary. In freshwater, the timing, frequency, and magnitude of river discharge should be evaluated at regular intervals (spring run-off, droughts, pulse events) and related to fishery data including, but not limited to, fishway operational schedules, fish movement and behavior data, spawning success, habitat suitability, and juvenile recruitment and outmigration. In the near-shore and marine environment, monitoring, and studies to assess shifts in conditions and habitats (e.g., water temperatures, currents, food sources, predators) should occur at regular intervals. The ASMFC 2020 American Shad Benchmark Stock Assessment and Peer Review provides modeling analyses that shows reduced growth rates and maximum size with increase sea surface temperatures (ASMFC, 2020). Additional work to understand climate change effects in freshwater and estuarine habitats on life history events and/or population level effects should also be examined.

Efforts to improve climate change resiliency should be pursued. Strategies should be developed and implemented to reduce stressors associated with climate change including drought, floods and increasing temperatures. Disaster management, urban planning, and river restoration are some strategies that can help mitigate the impacts of climate change.

4.7.2 Agencies with regulatory authority:
Regulatory authorities for climate change are not clearly in place currently. However, both state and federal resources agencies have recognized the need to incorporate the reality of climate change as physical scientists work to develop future scenarios on effects (e.g., temperature regimes, river discharge, rainfall, snowpack) that may, to varying degrees, affect species occurrence, population viability, and habitat quantity and quality.

4.7.3 Goal/Target:
It will be desirable to understand any trends in population metrics or other parameters, and any linked climate change drivers that may affect population structure, distribution, abundance, and viability. The resource agencies will seek to improve climate change resiliency and reduce other anthropogenic impacts that may exacerbate these impacts. Ultimately the agencies will seek to ensure the full restoration and long-term sustainability of this population given it is not at the extreme end of its distribution range.

4.7.4 Progress:
New or updated federal and state resource plans are required to include climate change.

4.7.5 Timeline:
Ongoing.

4.8 Threat: Invasive Species

4.8.1 Recommended Action:
Invasive aquatic plant species are increasing in occurrences and expanding their range within the Merrimack River watershed, impacting native aquatic species and habitats. Variable milfoil and Asian clam are both found in reaches throughout the Merrimack (Nedeau 2017; NH DES 2020) while variable milfoil, Eurasian milfoil, fanwort, water chestnut, European naiad, and curly leaf pondweed have been identified in the Nashua (NH DES 2020). and water chestnut and Eurasian milfoil are also present in the Concord watershed (CISMA-SUASCO 2022). State agencies and NGOs have been working to monitor the locations and extent of these invasive plants and work with partners on mitigation measures including pulling plants before they go to seed. This highly labor-intensive approach includes federal agency assistance and NGOs. Other invasive organisms not yet present (documented) of potential concern include range expansions of Asian mussel species (e.g., zebra mussel) and other organisms that have demonstrated detrimental impacts when introduced in other aquatic systems (e.g., blue catfish, snakehead).

4.8.2 Agencies with regulatory authority:
State agencies have developed statutes that forbid the importation of known invasive plants and many other non-natives species, with associated fines. Similarly, there are regulations requiring boaters clean all equipment, including fishing gear, live wells, boats and trailers, or be subject to fines. Importation bans for specific species occur at the federal and state level.

4.8.3 Goal/Target:
Measures that can help prevent either the direct or indirect introduction of invasive species should continue to focus on outreach and education. The development and responsible implementation of safe and effective measures to reduce the introduction, rate of spread, and establishment of invasive species should continue to be explored and evaluated.

4.8.4 Progress:
State agencies have increased efforts on education and outreach with boaters and anglers. Partnerships to manage certain areas (pulling of plants) have been developing. Aquatic Nuisance Species funding at the federal level has been increasing in recent years due to the extent of this problem. These funds are used primarily by state agencies and have increased monitoring, assessment, and planning activities. State agencies are also participating in the permitting process to ensure herbicide treatments of aquatic invasive plants do not have negative impacts on spawning and nursery habitat for diadromous fish, including shad.

4.8.5 Timeline:
Ongoing.

5 HABITAT RESTORATION PROGRAM

5.1 Barrier removal and fish passage program

The MRTC maintains a focused barrier removal and fish passage program that is executed by the member agencies depending on jurisdiction. In addition to the seven dams highlighted in Section 4.1, the MRTC and individual member agencies are actively involved in passage improvements and dam removals throughout the watershed.

In 2017, significant restoration work occurred on the Shawsheen River, which enters the Merrimack below the Essex Dam in Lawrence at rkm 44.9. In that year both the Marland Place Dam (ca. 1700s) and the Balmoral Dam (ca. 1920s) were removed, restoring access to miles of habitat inaccessible for centuries. The Ballardvale Dam remains as the last upstream barrier. Because this dam is in the lower half of the watershed, removing or modifying it would provide access to a substantial amount of historical habitat that would greatly benefit river herring and provide some habitat for American shad. The MRTC is also involved in relicensing activities on dams in non-target watersheds within shad's historical extent in the watershed, like the Winnipesaukee River. The agencies and partners will continue work on restoring shad habitat and habitat accessibility, including barrier removal, throughout the greater Merrimack Watershed.

A related task for habitat restoration is the calculation of fishway capacities for existing fishways in the watershed (*see* Barrier Inventory). Currently, the capacities for the existing facilities at the Essex and Pawtucket Dams and those needed to meet the goals for the Barrier to Migration Recommended Action have been calculated. To meet long term restoration goals USFWS and NMFS engineers should calculate capacity for the remaining existing structures in the watershed.

5.2 Hatchery product supplementation and adult transfer programs

Since 2009 the MRTC has maintained an active hatchery supplementation program that has been combined with the transfer of gravid fish from the Essex Dam to upriver mainstem spawning habitats. These efforts are spearheaded by USFWS and NHFGD.

Table 9. Annual shad stocking and transferred numbers, Merrimack River Watershed. Gravid adults collected at the Essex Dam; eggs collected, hatched, and cultured at the Nashua National Fish Hatchery.

Year	Total American Shad Stocked (Larvae)	Total American Shad Transferred (Adults)
2008	-	537
2009	1,299,369	1,051
2010	1,002,360	1,244
2011	2,855,947	966
2012	2,081,711	1,573
2013	4,634,166	1,868
2014	7,828,918	1,970
2015	2,296,061	2,055
2016	1,523,218	2,842
2017	4,832,379	3,235
2018	288,018	1,887
2019	594,597	2,212
2020	0[5]	250
2021		2,811
Grand Total	**29,236,744**	**24,501**

[5] Zero shad fry were stocked in 2020 due to the COVID-19 pandemic. USFWS hatchery staff were not permitted to cross state lines to collect brood stock from Essex Dam

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7 APPENDIX 1: BARRIERS TO HISTORICAL SHAD HABITAT IN THE MERRIMACK RIVER

Dam Name	Purpose	Height (m)	Width (m)	Length (m)	River	State	Town	Distance upstream (km)	Lat	Lon	Upstream Passage
Essex	Hydroelectric	10.0	-	274.3	Merrimack River	MA	Lawrence	48.0	42.7006	-71.1665	Lift
Pawtucket	Hydroelectric	4.6	-	333.0	Merrimack River	MA	Lowell	70.0	42.65257	-71.3224	Lift Vertical Slot
Amoskeag	Hydroelectric	8.8	-	216.4	Merrimack River	NH	Manchester	119.0	43.0021	-71.4719	Half Ice Harbor
Hooksett	Hydroelectric	14.0	-	179.8	Merrimack River	NH	Hooksett	132.0	43.1014	-71.4666	No
Garvin's Falls	Hydroelectric	5.5	-	167.6	Merrimack River	NH	Concord	140.0	43.1655	-71.51	No
Middlesex Falls	None - Breached	-	-	-	Concord River	MA	Lowell	0.6	42.64271	-71.3041	Breach
Centennial Island	Hydroelectric	< 3.0	-	70.0	Concord River	MA	Lowell	2.2	42.6293	-71.2984	Denil
Talbot Mills	None - Relic	3.1	-	38.7	Concord River	MA	North Billerica	7.0	42.59185	-71.2839	No
Assabet Dam	Hydroelectric	4.9	-	128.0	Assabet River (Concord)	MA	Acton	10.5	42.4407	-71.4316	No
Central Street Dam	None known	-	-	-	Sudbury River (Concord)	MA	Framingham	24.1	42.32492	-71.4015	No
Jackson Mills	Hydroelectric	10.1	-	54.9	Nashua River	NH	Nashua	2.0	42.7635	-71.4645	Denil
Mine Falls	Hydroelectric	-	-	-	Nashua River	NH	Nashua	6.4	42.7503	-71.5055	Lift
Pepperell	Hydroelectric	7.2	-	76.5	Nashua River	MA	Pepperell	14.5	42.66694	-71.575	No
Squannacook River Dam	None known	-	-	-	Squannacook River (Nashua)	MA	Groton	0.0	42.60262	-71.6278	No
Ice House Power	Hydroelectric	3.7	-	57.9	Nashua River	MA	Ayer	34.2	42.5528	-71.6189	No
McLane	None - Relic	5.5	-	54.9	Souhegan River	NH	Milford	22.5	42.83606	-71.6455	No
Goldman	None - Relic	-	-	52.7	Souhegan River	NH	Milford	22.9	42.83677	-71.6491	No
Pine Valley	Hydroelectric	7.0	-	61.0	Souhegan River	NH	Wilton	32.2	42.8389	-71.7285	No
Kelley's Falls	Hydroelectric	9.4	-	153.3	Piscataquog River	NH	Manchester	3.2	42.9935	-71.4962	No
Gregg's Falls	Hydroelectric	18.3	-	414.5	Piscataquog River	NH	Goffsttown	11.3	43.0169	-71.5686	No
Hadley Falls	Hydroelectric	6.1	-	91.4	Piscataquog River	NH	Goffsttown	13.8	43.0185	-71.5979	No
China Mill	Hydroelectric	-	-	46.0	Suncook River	NH	Pembroke	0.7	43.13009	-71.4563	No
Webster Pembroke	Hydroelectric	-	-	-	Suncook River	NH	Suncook	1.4	43.12967	-71.4506	No
Soucook River	None known	-	-	-	Soucook River	NH	Loudon	30.9	43.28646	-71.4685	No
Penacook Lower Falls	Hydroelectric	-	-	213.4	Contoocook River	NH	Boscawen	0.5	43.2852	-71.5952	No

Dam Name	Purpose	Height (m)	Width (m)	Length (m)	River	State	Town	Distance upstream (km)	Lat	Lon	Upstream Passage
Penacook Upper Falls	Hydroelectric	4.7	-	57.0	Contoocook River	NH	Concord	1.3	43.2836	-71.6022	No
Rolfe Canal	Hydroelectric	3.0	-	91.4	Contoocook River	NH	Concord	3.2	43.2725	-71.6045	No
Hopkinton	Hydroelectric	3.4	-	76.2	Contoocook River	NH	Hopkinton	20.5	43.2223	-71.716	No
Hoague-Sprague	Hydroelectric	4.3	-	91.4	Contoocook River	NH	Hopkinton	29.4	43.1904	-71.7481	No
Hopkinton Flood Control Dam	Flood control	23.2	-	240.8	Contoocook River	NH	Hopkinton	29.5	43.18857	-71.7479	No
Franklin Falls	Hydroelectric	-	-	-	Winnipesaukee River	NH	Franklin	0.8	43.4428	-71.6498	No
Stevens Mill Dam	Hydroelectric	6.7	-	24.4	Winnipesaukee River	NH	Franklin	2.3	43.4462	-71.6444	No
Clement Dam	Hydroelectric	5.0	-	36.6	Winnipesaukee River	NH	Tilton	8.3	43.4407	-71.5958	No
Lochmere Dam	Hydroelectric	3.4	-	48.8	Winnipesaukee River	NH	Tilton	16.5	43.4731	-71.534	No
Eastman Falls	Hydroelectric	11.3	-	103.9	Pemigewasset River	NH	Franklin	1.6	43.44757	-71.6585	No
Franklin Falls	Flood control	42.7	-	530.4	Pemigewasset River	NH	Franklin	4.6	43.46757	-71.6609	No
Ayers Island	Hydroelectric	21.9	-	213.1	Pemigewasset River	NH	Bristol	24.8	43.59816	-71.7184	No

Dam Name	Purpose	Owner	Height (m)	Width (m)	Length (m)	Impoundment size (ha)	Water Capacity (acre feet)	River	State	Town	Distance upstream (km)	Lat	Lon	US Passage	FP Capacity	FP Effectiveness	DS Passage	Source
Essex	Hydroelectric	Central Rivers Power	10.0	-	274.3	26.1	19,900	Merrimack River	MA	Lawrence	48.0	42.7006	-71.1665	Lift	Limited[1]	Unknown	Surface bypass	MassGIS
Pawtucket	Hydroelectric	Central Rivers Power	4.6	-	333.0	291.4	3,960	Merrimack River	MA	Lowell	70.0	42.65257	-71.3224	Lift	Limited[2]	30.40%	Surface bypass	MassGIS
Amoskeag	Hydroelectric	Central Rivers Power	8.8	-	216.4	193.4	-	Merrimack River	NH	Manchester	119.0	43.0021	-71.4719	Vertical Slot Half Ice Harbor	Sufficient Limited[3]	75% (herring) Poor[4]	Surface bypass	NH GRANIT
Hooksett	Hydroelectric	Central Rivers Power	14.0	-	179.8	163.9	-	Merrimack River	NH	Hooksett	132.0	43.1014	-71.4666	No	N/A	N/A	Surface bypass	NH GRANIT
Garvin's Falls	Hydroelectric	Central Rivers Power	5.5	-	167.6	259.0	-	Merrimack River	NH	Concord	140.0	43.1655	-71.51	No	N/A	N/A	Low level and surface bypass	NH GRANIT
Middlesex Falls	None - Breached	City of Lowell	-	-	-	-	-	Concord River	MA	Lowell	0.6	42.64271	-71.3041	Breach				MassGIS
Centennial Island	Hydroelectric	Centennial Island Hydroelec Co (MA)	< 3.0	-	70.0	-	-	Concord River	MA	Lowell	2.2	42.6293	-71.2984	Denil	Limited[5]	Poor	Surface bypass	MassGIS
Talbot Mills	None - Relic	Private	3.1	-	38.7	-	-	Concord River	MA	North Billerica	7.0	42.59185	-71.2839	No				MassGIS
Assabet Dam	Hydroelectric	Acton Hydro Electric (MA)	4.9	-	128.0	8.1	-	Assabet River (Concord)	MA	Acton	10.5	42.4407	-71.4316	No				MassGIS
Central Street Dam	None known	Private	-	-	-	-	-	Sudbury River (Concord)	MA	Framingham	24.1	42.32492	-71.4015	No				MassGIS
Jackson Mills	Hydroelectric	City Of Nashua , New Hampshire	10.1	-	54.9	16.0	-	Nashua River	NH	Nashua	2.0	42.7635	-71.4645	Denil	Limited[6]	Unknown	Surface bypass	NH GRANIT
Mine Falls	Hydroelectric	City Of Nashua , New Hampshire	-	-	-	97.9	450	Nashua River	NH	Nashua	6.4	42.7503	-71.5055	Lift	Limited	56%(herring) [7]	Surface bypass	NH GRANIT
Pepperell	Hydroelectric	Pepperell Hydro Company, LLC	7.2	-	76.5	119.0	-	Nashua River	MA	Pepperell	14.5	42.66694	-71.575	No			Surface bypass	MassGIS
Squannacook River Dam	None known	Town of Groton, MA	-	-	-	-	-	Squannacook River (Nashua)	MA	Groton	0.0	42.60262	-71.6278	No				MassGIS
Ice House Power	Hydroelectric	Ice House Partners, Inc.	3.7	-	57.9	55.4	-	Nashua River	MA	Ayer	34.2	42.5528	-71.6189	No			Surface bypass	MassGIS
McLane	None - Relic	Private	5.5	-	54.9	-	-	Souhegan River	NH	Milford	22.5	42.83606	-71.6455	No			Surface bypass	NH GRANIT
Goldman	None - Relic	Private	-	-	52.7	-	-	Souhegan River	NH	Milford	22.9	42.83677	-71.6491	No			Surface bypass	NH GRANIT
Pine Valley	Hydroelectric	PVC Commerical Center, LLC.	7.0	-	61.0	2.8	-	Souhegan River	NH	Wilton	32.2	42.8389	-71.7285	No			Surface bypass	NH GRANIT
Kelley's Falls	Hydroelectric	Kelley's Falls, LLC	9.4	-	153.3	52.2	1,350	Piscataquog River	NH	Manchester	3.2	42.9935	-71.4962	No			Surface bypass	NH GRANIT
Gregg's Falls	Hydroelectric	Eagle Creek Renewable Energy, LLC	18.3	-	414.5	55.4	3,650	Piscataquog River	NH	Goffsttown	11.3	43.0169	-71.5686	No			Surface bypass	NH GRANIT
Hadley Falls	Hydroelectric	New Hampshire DES	6.1	-	91.4	9.7	-	Piscataquog River	NH	Goffsttown	13.8	43.0185	-71.5979	No			Surface bypass	NH GRANIT
China Mill	Hydroelectric	Essex Power Company	-	-	46.0	-	-	Suncook River	NH	Pembroke	0.7	43.13009	-71.4563	No				NH GRANIT
Webster Pembroke	Hydroelectric	Algonguin Power Income Fund	-	-	-	10.5	147	Suncook River	NH	Suncook	1.4	43.12967	-71.4506	No			Surface bypass	NH GRANIT
Soucook River	None known	Town of Loudon (NH)	-	-	-	-	-	Soucook River	NH	Loudon	30.9	43.28646	-71.4685	No				NH GRANIT
Penacook Lower Falls	Hydroelectric	Briar-Hydro Associates (MA)	-	-	213.4	3.4	54	Contoocook River	NH	Boscawen	0.5	43.2852	-71.5952	No			Surface bypass	NH GRANIT
Penacook Upper Falls	Hydroelectric	Briar-Hydro Associates (MA)	4.7	-	57.0	4.5	-	Contoocook River	NH	Concord	1.3	43.2836	-71.6022	No			Surface bypass	NH GRANIT
Rolfe Canal	Hydroelectric	Briar-Hydro Associates (MA)	3.0	-	91.4	20.2	-	Contoocook River	NH	Concord	3.2	43.2725	-71.6045	No			Surface bypass	NH GRANIT
Hopkinton	Hydroelectric	Hopkinton, Town Of (NH)	3.4	-	76.2	44.5	-	Contoocook River	NH	Hopkinton	20.5	43.2223	-71.716	No			Surface bypass	NH GRANIT
Hoague-Sprague	Hydroelectric	Green Mountain Power Corp (VT)	4.3	-	91.4	0.8	-	Contoocook River	NH	Hopkinton	29.4	43.1904	-71.7481	No				NH GRANIT
Hopkinton Flood Control Dam	Flood control	USACE	23.2	-	240.8	89.0	3,700	Contoocook River	NH	Hopkinton	29.5	43.18857	-71.7479	No				NH GRANIT
Franklin Falls	Hydroelectric	Franklin Falls Hydro Elec Co (NH)	-	-	-	-	-	Winnipesaukee River	NH	Franklin	0.8	43.4428	-71.6498	No			Surface bypass	NH GRANIT
Stevens Mill Dam	Hydroelectric	Franklin Power, LLC.	6.7	-	24.4	0.4	-	Winnipesaukee River	NH	Franklin	2.3	43.4462	-71.6444	No			surface and mid-level bypass	NH GRANIT
Clement Dam	Hydroelectric	Clement Dam Hydroelectric,LLC	5.0	-	36.6	-	-	Winnipesaukee River	NH	Tilton	8.3	43.4407	-71.5958	No			Surface bypass	NH GRANIT
Lochmere Dam	Hydroelectric	New Hampshire Water Resources (NH)	3.4	-	48.8	1725.6	-	Winnipesaukee River	NH	Tilton	16.5	43.4731	-71.534	No			Surface bypass	NH GRANIT
Eastman Falls	Hydroelectric	Hse Hydro Nh Eastman Falls, Llc	11.3	-	103.9	-	-	Pemigewasset River	NH	Franklin	1.6	43.44757	-71.6585	No			Surface bypass	NH GRANIT
Franklin Falls	Flood control	USACE	42.7	-	530.4	180.0	2,800	Pemigewasset River	NH	Franklin	4.6	43.46757	-71.6609	No			Surface bypass	NH GRANIT
Ayers Island	Hydroelectric	Hse Hydro Nh Ayers Island, Llc	21.9	-	213.1	242.8	10,000	Pemigewasset River	NH	Bristol	24.8	43.59816	-71.7184	No			Surface bypass	NH GRANIT

Footnotes

[1] Capacity is limited by the size of the fish lift and operational limitations, especially in low flow years.

[2] Capacity is limited by poor trap efficiency at the lift and zone of passage conditions in the bypass reach.

[3] Calculations should be performed but capacity may be limited by the internal hydraulics of the existing fishway and attraction water system deficiencies.

[4] FP effectiveness is is unkown but assumed to be poor because FWS criteria are not being met within the fishway for submergence depth and drop per pool.

[5] Capacity is limited due to this fishway not being constructed as designed per FWS site inspection report.

[6] Capacity is limited by a poor design that results in a low amount of flow coming out of each entrance, therefore not meeting FWS criteria for attraction flow and submergence depth.

[7] Upstream studies for river herring were conducted and found to be 56% effective. Given the hydraulics at the entrance (i.e., not meeting submergence depth criteria) and the small volume of water maintained within the fishway entrance channel and holding pool it is assumed that shad passage effectiveness would be less than 56%

Sustainable Fishery Management Plan for New York River Herring Stocks

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February 2022

Submitted for review
to the
Atlantic State Marine Fisheries Commission

Executive Summary

Amendment 2 to the Atlantic States Marine Fisheries Commission Shad and River Herring Interstate Fishery Management Plan requires member states to demonstrate that fisheries for river herring (alewife and blueback herring) within their state waters are sustainable. A sustainable fishery is defined as one that will not diminish potential future reproduction and recruitment of herring stocks. If states cannot demonstrate sustainability to the Atlantic States Marine Fisheries Commission (ASMFC), they must close their herring fisheries.

New York State proposes to maintain a restricted river herring (alewife and blueback herring) fishery in the Hudson River and tributaries and to continue closures of river herring fisheries elsewhere in the State. This proposal conforms to Benefit 4 of the New York State Hudson River Estuary Action Agenda.

Stock Status

Alewife and blueback herring are known to occur and spawn in New York State in the Hudson River and tributaries, the Bronx River, and several streams on Long Island. The Hudson River is tidal to the first dam at Troy, NY (rkm 245). Data on stock status are available for the Hudson River and tributaries. Few data are available for river herring in streams in Bronx County, southern Westchester County, and on Long Island. River herring are rarely encountered in the New York portion of the Delaware River.

Hudson River: Commercial and recreational fisheries exploit the spawning populations of river herring in the Hudson River and tributaries. Most river herring taken in the Hudson and tributaries are used as bait in the recreational striped bass fishery. The magnitude of the recreational fishery for river herring is unknown for most years. However, we have estimated recreational harvest from 2007-2020 using data obtained from our Cooperative Angler Program and a statewide creel survey conducted in 2007. Estimated recreational river herring harvest ranged from 85,249 fish in 2007 to 426,098 fish in 2016, with an average of 258,281 herring (~92,981 lbs.) from 2013-2020. To put estimated recreational harvest in context, run counts from Black Creek, a small tributary with approximately 1.8 km of available spawning habitat, averaged 324,698 alewives (~116,891 lbs.) annually during the same time period. Black Creek is just one of the 68 primary tributaries to the Hudson River.

Since 1995, landings have been separated between the Hudson and other waters (marine) but due to optional participation and minimal enforcement of commercial reporting, any in-river reporting from 1995-1999 is unreliable. From 2000 to 2012, landings averaged 15,136 pounds, peaking in 2002 at 20,346 pounds. Following regulation changes in 2013, reported commercial landings declined to roughly 40% (~6,000 lbs/year) of the average from 2000 through 2012.

Fishery dependent data on river herring status since 2000 are available from commercial reports and from on-board monitoring. Annual scap net efforts were relatively steady through 2012 but dropped dramatically in 2013 when net use became prohibited in tributaries. Scap net CPUEs declined from 2000 to 2007 but have increased from 2007 to present. Drift gill net CPUEs increased steadily from 2000 peaking in 2014 and have been declining to present. Drift gill net effort declined from 2006 to 2010 and has remained relatively stable from 2010 to present. Fixed gill net effort in the lower river has decreased steadily since 2000 while CPUEs increased from 2010 peaking in 2014 followed by a slight decline from 2014 to present; however, recent CPUEs

remain well above the mean CPUEs during the time period 2000 to 2010.

The extent of the loss of New York's river herring stocks through bycatch in ocean commercial fisheries remains largely unknown; however, the recent increase in the occurrence of repeat spawn marks in both species of river herring are indicative of reduced mortality while at sea.

Fishery independent data on size and age composition of river herring spawning in the Hudson River Estuary are available from 1936, intermittently since the late 1970s and annually beginning in 2012. Prior to 2012, the intermittent effort expended to catch river herring resulted in relatively low and variable catches. Data collected in 1936 (Greeley 1937) are used as reference only due to very small sample sizes. However, these data provide a historic perspective of potential maximum sizes of both species of river herring.

Mean total length and mean length at age of both river herring species in the Hudson River have increased since 2012 when sampling efforts increased and became consistent. Mean length at age for both species across all ages has been either stable or increasing with the majority increasing. The increases in mean length and mean length at age are indicative of reduced mortality both within river and during ocean residency.

Total instantaneous mortality (Z) estimates derived from age and repeat spawning data have followed similar trends in most years. Mortality estimates for alewives declined from 2012 to 2014. In 2015 and 2016, age-based mortality estimates for female alewives increased dramatically while repeat spawn-based estimates continued to decline. This may be due to a large year class moving through the fishery resulting in over dispersion of older fish and was further compounded by fewer age three and age four fish observed in 2015-2016. Current mortality estimates have declined, returning to pre-2015 levels. Mortality estimates for blueback herring have declined or remained stable since 2012.

Since the previous version of this plan, we developed a total mortality threshold ($Z_{40\%}$) using a modified Thompson-Bell yield per recruit model following the methods described in the most recent American shad benchmark stock assessment (ASMFC 2020). For details on model structure see section 2.5 of the assessment. The resulting $Z_{40\%}$ thresholds are $Z=1.26$ and $Z=1.19$ for female alewife and blueback herring, respectively. The final three-year average mortality estimates were 0.55 and 0.67 for female alewife and blueback herring, respectively. Both Z values are below the $Z_{40\%}$ thresholds indicating that adult female mortality is sustainable for both species.

Young-of-year (YOY) production has been measured annually by beach seine since 1980. CPUE of alewife remained low through the late 1990s then increased erratically through 2010 and has remained relatively stable above the benchmark from 2011 to present. CPUE of young of year blueback herring has varied with a very slight downward trend since 1980. Over the past decade, YOY index values have fallen below the 25th percentile only twice for alewives and four times for blueback herring; however, the 2014 blueback index value was the highest in the history of the survey.

Streams on Long Island, Bronx and south shore of Westchester County:
Limited data that have been collected for Long Island river herring populations are not adequate to characterize stock condition or to choose a measure of sustainability.

Delaware River in New York:
River herring in the New York portion of the Delaware River are very rare. While there have been individual YOY fish occasionally found (Horwitz et al. 2014), we have no record of any fishing effort for either species.

Proposed Fishery for the Hudson River and Tributaries

Given the measures of stock status described above, we are proposing a continuation of the Hudson River fishery at this time. This includes a continuation of the restricted fishery in the main-stem Hudson River, a partial closure of the fishery in tributaries, and annual stock monitoring as described in the previous SFMP (Eakin et al. 2017). We propose to continue to use the sustainability target for juvenile indices which is defined as three consecutive juvenile index values below the 25th percentile of the time series as well as the new total mortality thresholds developed for this plan which are Z = 1.26 and Z = 1.19 for adult female alewife and blueback herring, respectively. We will monitor, but not set targets for mean length, mean length at age and frequency of repeat spawning from fishery independent spawning stock sampling as well as the CPUE in the commercial fixed gill net fishery in the lower river below the Bear Mountain Bridge.

A summary of existing restrictions is provided in Appendix 1. Restrictions to the recreational fishery include: a 10 fish per day creel limit for individual anglers with a boat limit of 50, a 10 fish creel limit per day for paying customers with a boat limit of 50 for charter vessels, no use of nets in tributaries, and the continuation of various small nets in the main river. Restrictions to the commercial fishery and use of commercial gears include: a net ban in the upper 28 km of the main-stem estuary, on the American shad spawning flats, and in tributaries; gill net mesh and size restrictions; a ban on fixed gears or night fishing above the Bear Mountain Bridge; seine and scap/lift net size restrictions; 36-hour lift period to all commercial net gears; and monthly mandatory reporting of catch and harvest.

Proposed Moratorium for streams on Long Island, Bronx County, the southern shore of Westchester County, and the Delaware River and its tributaries north of Port Jervis NY

Due to the inability to determine stock condition for these areas, New York State proposes to continue a closure of all fisheries for river herring in Long Island streams and in the Bronx and Westchester County streams that empty into the East River and Long Island Sound and New York's portion of the Delaware River as outlined in the previous SFMP (Eakin et al. 2017).

This SFMP does not directly address incidental catch in the ocean but focuses on fisheries managed exclusively by New York State. New York is working with the National Marine Fisheries Service, the New England Fishery Management Council and the Mid-Atlantic Fishery Management Council to reduce incidental river herring harvest in fisheries managed by these groups.

CONTENTS

1 INTRODUCTION

Amendment 2 to the Atlantic States Marine Fisheries Commission Shad and River Herring Interstate Fishery Management Plan was adopted in 2009. It requires member states to demonstrate that fisheries for river herring (alewife and blueback herring) within state waters are sustainable. A sustainable fishery is defined as one that will not diminish potential future reproduction and recruitment of herring stocks. If states cannot demonstrate sustainability to ASMFC, they must close their herring fisheries.

In response to Amendment 2 New York State proposed, and ASMFC approved, a Sustainable Fishery Management Plan (SFMP). This SFMP included an experimental five-year restricted fishery in the Hudson River, a partial fishery closure in tributaries, and annual stock monitoring. Monitoring includes young of year indices, and for adults: age and length characteristics, mortality estimators, and commercial fishing catch per unit effort (CPUE).

The following proposes an updated five-year SFMP for river herring in waters of New York State with additional sustainability targets and thresholds. The goal of this plan is to ensure that river herring resources in New York provide a source of forage for New York's fish and wildlife and provide opportunities for recreational and commercial fishing now and in the future.

The fisheries that existed back in colonial days in the Hudson Valley of New York undoubtedly included river herring among the many species harvested. River herring, comprised of both alewife (*Alosa pseudoharengus*), and blueback herring (*Alosa aestivalis*) were among the fish mentioned by early explorers and colonists – the French Jesuits, Dutch and English. Archaeological digs along the Hudson in Native American middens indicates that the fishery resources in the river provided an important food source to Native Americans.

Written records for river herring harvest in New York begin in early 1900. Landings peaked in the early 1900s, again in the 1930s with the final peak in the early 1980s. Landings declined from the mid-1980s to the late 1990s. Since the late 1990s, landings have remained relatively stable with a slight decline in the most recent years. Factors in addition to fishing have affected the stocks: habitat destruction (filling of shallow water spawning habitat; loss of access to tributary spawning habitat through the construction of dams and culverts) and water quality problems associated with pollution that caused oxygen blocks in major portions of the river (Albany and New York City). Water quality has improved over the last 30 years.

New York State does not augment wild river herring stocks with hatchery progeny. The New York City Parks Department initiated an experimental restoration program in which alewife were captured in a Long Island Sound tributary in Connecticut and released in the Bronx River above the first barrier. Limited returns to the river suggest that some reproduction has occurred from these stockings. A variety of non-governmental organizations along with state and federal agencies are working on development of fish passage for river herring on Long Island streams and Hudson River tributaries.

2 MANAGEMENT UNITS

The management unit for river herring stocks in New York State comprises three sub-units. All units extend throughout the stock's range on the Atlantic coast.

- The largest consists of the Hudson River Estuary from the Verrazano Narrows at New York City to the Federal Dam at Troy including numerous tributary streams (Figure 1).
- The second is made up of all Long Island streams that flow into waters surrounding Long Island and streams on the New York mainland (Bronx and Westchester Counties) that flow into the East River and/or Long Island Sound (Figure 2).
- The third subunit consists of the non-tidal Delaware River and tributaries upriver of Port Jervis, NY.

2.1 Description of the Management Unit Habitat

2.1.1 Hudson River and tributaries

Physical description and habitat use:

The Hudson River flows from Lake Tear of the Clouds in the Adirondacks to the Battery in New York City. It is influenced by tides to the Federal Dam in Troy, 245 km from the Battery. The salt front moves, depending on freshwater inputs from Hudson River tributaries and tidal flow, and generally varies in location from Tappan Zee (rkm 45) to Newburgh (rkm 95). The river includes two major estuarine bays: Haverstraw Bay (rkm 55) and Tappan Zee Bay (rkm 45). These bays are mainly shallow water less than four meters deep where the river extends up to five and a half kilometers from shore to shore. The river also includes a narrow and deep section, the Hudson Highlands, where the river is less than one kilometer wide and over 30 meters deep (Stanne et al., 2007).

The Hudson River below the Federal Dam at Troy has approximately 68 primary tributaries, most of which provide some spawning habitat for river herring (Schmidt and Copper 1996). The largest of these tributaries is the Mohawk River, which enters the Hudson two kilometers north of the Troy Dam. Diadromous fish access to the Mohawk River, and portions of the non-tidal Hudson above the Federal Dam, is possible only through the Erie Canal and Champlain lock system. Fish passage for migratory species at the Troy dam is required by a 2009 FERC relicensing settlement agreement and is to be installed within the next few years. Other major tributaries of the Hudson River, all in the estuary, include the Croton River, Wappingers Creek, Rondout Creek, Esopus creek, Catskill Creek, and Stockport Creek.

River herring in the Hudson River spawn in the spring. Alewives are the first to enter the estuary, arriving as early as mid-March and spawning through mid-May. Blueback herring arrive slightly later, generally in April and spawning into early June (Hattala and Kahnle 2007; Eakin, Cornell University, unpublished data). River herring spawn in the entire freshwater portion of the Hudson and its tributaries up to the first impassible barrier. Adults of both species spawn in Hudson River tributaries, but also spawn in shallow waters of the main-stem Hudson. The nursery area for river herring includes the spawning reach and extends south to Newburgh Bay (rkm 90) encompassing the freshwater portion of the estuary.

Some river herring migrate upstream of the Federal Dam through the Champlain and Erie Canal lock systems. We do not know: 1) if a significant number of river herring move upstream of the dam relative to the entire Hudson River spawning population 2) how many post-spawn adult river herring survive their return trip out of the canal system or 3) if the juvenile herring are able to survive and return to the Hudson River below the Federal Dam. Construction of passage on the Federal Dam will facilitate upstream and downstream migration.

2.1.2 Long Island, Bronx, and Westchester County

Physical description and habitat use:

Freshwater tributaries in the New York portion of the Atlantic Ocean and Long Island Sound watershed are also important for New York river herring (Figure 2). This watershed drains most of the New York City Metropolitan Area, all of Long Island, and portions of Westchester County. The Atlantic Ocean coastline extends 189 kilometers from Rockaway Point to Montauk Point. The watershed includes 840 kilometers of freshwater rivers and streams.

The herring runs in streams on Long Island are comprised almost exclusively of alewife (B. Young, NYSDEC retired, personal communication). Most streams are relatively short runs to saltwater from either head ponds (created by dammed streams) or deeper kettle-hole lakes. Either can be fed by a combination of groundwater, run-off, or area springs. Spawning occurs mid-March through May in the tidal freshwater below most of the barriers. Natural passage for spawning adults into the head ponds or kettle lakes is present in very few streams.

There have been efforts to understand river herring runs on Long Island since 1995.The 2018 estimated alewife population was 150,000, with 24 identified alewife runs (https://www.arcgis.com/home/webmap/viewer.html?webmap=e6ab78352f2e4076876380e7500567e9&extent=-73.3924,40.6352,-72.7036,40.9549) Several runs of alewives on Long Island had been known to occur in East Hampton, Southampton, Riverhead and Brookhaven. With the advent of a more aggressive restoration effort in Riverhead on the Peconic River other runs have come to light (https://www.arcgis.com/home/webmap/viewer.html?webmap=e6ab78352f2e4076876380e7500567e9&extent=-73.3924,40.6352,-72.7036,40.9549). Since 2006, an annual volunteer alewife spawning run survey has been conducted. This volunteer effort predominantly documents the presence or absence of alewives in Long Island coastal streams. In 2010, a volunteer investigation was initiated to quantify the Peconic River alewife run. Size and sex data have been collected annually since 2011. A first order estimate of the Peconic River spawning run size has been attempted since 2010; attempts have been made to improve these observations with video counts as well as alewife tagging. These efforts have been undertaken to understand the Long Island coastal streams and to improve the runs that exist there (https://seatuck.org/river-revival/).

We have no record of river herring in any of the streams in southern Westchester County. In the Bronx River (Bronx County) alewives were introduced to this river in 2006 and 2008 and some adult fish returned in 2009 (Jackman and Ruzicka 2009). There have been five years of re-stocking of the Bronx River. In 2021, 250 alewives from the Peconic River were restocked into the Bronx River. Monitoring of this run has recently been updated to include eDNA techniques.

2.1.3 Delaware River

River herring in the New York portion of the Delaware River are very rare. While there have been individual young-of-year (YOY) fish occasionally found (Horwitz et al 2014), we have no record of any fishing effort for either species.

2.2 Habitat Loss and Alteration

Hudson River Estuary

Hudson River tributaries provide important habitat to both migrating and resident fishes, as well as other wildlife. Barriers to upstream and downstream movement exist in tributaries to the Hudson River, many of them in relatively short distance upstream from the confluence with the Hudson River. While many of these barriers are natural features, such as waterfalls and ledges, there exist numerous anthropogenic barriers, including dams (some opportunistically built on top of existing natural barriers), undersize and improperly positioned culverts, and undersized bridges. Thus, many opportunities exist to remove man-made barriers in order to restore historical upstream and downstream access to important habitats for both diadromous and resident fishes. Based on NOAA's 2009-2014 evaluation of 67 lower Hudson tributaries, the first barrier upstream from the Hudson are man-made on 27 tributaries, while 37 are natural and three are undetermined (Alderson and Rosman 2014). After further assessment to consider where barrier removal is practical and beneficial to river herring, this research estimated that 56 tributary kilometers have the potential to be opened to river herring via the removal of 27 barriers on 14 tributaries. The largest gains in total stream miles can be found on the following five tributaries: Claverack, Croton, Moodna, Rondout, and Sparkill Creeks. Restoration opportunities on these five tributaries could enhance access to river herring habitat for an estimated 35.8 kilometers. Removal of man-made barriers in the Hudson River Estuary is a high priority because of the potential for habitat gains and the perceived limitation of number of opportunities for large-scale restoration.

The introduction of zebra mussels in the Hudson in 1991, and their subsequent explosive growth in the river, quickly caused pervasive changes in the phytoplankton (80% drop) and micro- and macro-zooplankton (76% and 50% drop respectively) communities (Caraco et al. 1997). Water clarity improved dramatically (up by 45%) and shallow water zoobenthos increased by 10%. Given these massive changes, Strayer et al. (2004) explored potential effects of zebra mussel impact on YOY fish species. Most telling was a decrease in observed growth rates and abundance of YOY fishes, including open-water species such as alewife and blueback herring. A decade later, Strayer et al. (2014), reporting on the improvement in zooplankton and macrobenthos inhabiting deep water indicated that abundance of juvenile alewives increased during the late zebra mussel invasion period while post-yolk sac larval abundance did not. The abundance of post-yolk sac and juvenile American shad and post-yolk sac river herring declined during the early to later zebra mussel invasion period. It is not yet clear how this constraint affects annual survival and subsequent recruitment.

Another factor that is not well researched or understood is the potential barriers posed by the railroads along both the east and west sides of the Hudson River. Tributaries once flowed freely, with unobstructed hydraulics, from the upland valley to the wide estuary. While these connections still exist, they are much different today than they were historically. Tributaries are forced through bridge and culvert constrictions under the tracks as they make their way to the Hudson River. The impact of this funneling effect on access from the Hudson into tidal tributary mouths is not well understood.

Long Island, Bronx, and Westchester County

Most streams on Long Island and in the Bronx and Westchester Counties were impacted by

human use as the population expanded. Many streams were blocked off with dams to create head ponds, initially used to contain water for power or irrigation purposes for agriculture. The dams remain; only a few with passage facilities. Many streams were also negatively affected by the construction of highways, with installations of culverts or other water diversions which impact immigrating fishes.

2.3 Habitat Restoration

Hudson River Estuary

The Hudson River Estuary Habitat Restoration Plan (Miller 2013) has identified a number of river and tributary restoration activities that will benefit river herring, including barrier mitigation and side channel restoration. Recent research has highlighted important barrier removal opportunities for river herring habitat in the Hudson River Estuary (Alderson and Rosman, 2014). Mitigation of these barriers is an important priority for many researchers, non-profits, and local governments in the estuary, and features prominently in the Hudson River Estuary Program's Action Agenda 2015-2020 (2015).

In May 2016, the first dam upstream of the confluence with the Hudson River was removed from the Wynants Kill, a relatively small tributary in Troy, NY, downstream of the Federal Dam. Within days of the May 2016 removal, hundreds of herring moved past the former dam location into upstream habitat. Subsequent sampling efforts yielded river herring eggs, providing evidence that river herring were actively spawning in the newly available habitat. This dam removal will provide an additional half kilometer of spawning habitat for river herring that has not been available for 85 years.

There are also a number of side-channel restoration projects under development that will improve habitat for river herring in the estuary. Side channels within the riverbed provide important shallow water and intertidal habitats that are isolated from the higher energy regime of the main channel. These side channels historically occurred in the northern third of the estuary as part of a braided river-channel system dominated by vegetated shallows and intertidal wetlands. These habitats were destroyed on a large scale in the early twentieth century, particularly in the upper estuary, as a result of dredge and fill activities associated with construction of the federal navigation channel.

Gay's Point (rkm 196) was identified as a suitable location for side channel restoration and in 2018, the creation of a side channel was completed. The site previously consisted of an artificially created tidal embayment that is separated from the main river channel by dredge spoils. Tidal backwaters, such as those previously at Gay's Point, typically have lower current velocities, greater sediment deposition resulting in finer substrates, higher water temperatures, and lower dissolved oxygen levels than side channels with relatively unimpeded flow. Increasing tidal flow through the embayment at Gay's Point has improved water quality, provide coarser-grained bed materials, and ultimately create more productive spawning, nursery, and foraging habitat for river herring.

Long Island, Bronx, and Westchester County

Initial barrier mitigation to benefit river herring was summarized in the last SFMP and included

restoration of herring runs on the Carmans and Peconic Rivers (Eakin et al. 2017), and rudimentary fish passage at Beaver Lake, Oyster Bay. Since 2011, additional completed barrier mitigation projects that benefit alewife include the installation of passage devices at thirteen locations (Canaan Lake, Brookhaven; Twin Ponds, Centerport; Argyle Lake, Babylon; Udall's Mill Pond, Saddle Rock; and Massapequa Creek, Massapequa; Penataquit Creek, Bay Shore; Grangebel Park, Riverhead; 182nd St Dam, Bronx River, Bronx; Upper Lake, Carmans River; Beaver Lake, Oyster Bay; Yaphank Creek, Wertheim National Wildlife Reserve; Mill Creek, Hubbard County Park; Edwards Avenue Dam, Riverhead); a box culvert modification at Alewife creek, Southampton; and dam removals at Harrison Pond in Smithtown; and at Sunken Meadow Sate Park . Additionally, a dam removal project is expected to begin in 2022 for the Woodhull Dam on Little River in Riverhead to provide additional spawning habitat once barriers have been mitigated. Barrier mitigation remains a priority for several environmental groups and local, state, and federal agencies.

3 STOCK STATUS

Following is a description of all available data for the Hudson's river herring stocks, plus a brief discussion of their usefulness as stock indicators. Sampling data are summarized in Tables 1 and 2. Sampling was in support of the Hudson River Estuary Action Agenda and was partially funded by the Hudson River Estuary Program.

3.1 Fisheries Dependent Data

3.1.1 Commercial Fisheries

Ocean Harvest

Range of the New York river herring along the Atlantic coast is from the Bay of Fundy, Canada and Gulf of Maine south to waters off Virginia (NAI 2008; Eakin 2016).

Directed Ocean Harvest

Directed ocean harvest within state waters of river herring was effectively eliminated through the passage of Amendment 2 to the Atlantic States Marine Fisheries Commission Shad and River Herring Interstate Fishery Management Plan in 2009. The amendment requires member states to demonstrate that fisheries for river herring within their state waters are sustainable. As of 2021, five states (Maine, New Hampshire, Massachusetts, New York, and South Carolina) have approved plans in place and none of these plans identifies directed ocean harvest as a component of their sustainable fishery management plan.

Incidental Ocean Harvest

Quantifying the impact of bycatch and incidental fisheries on Hudson River herring remains difficult. Two Federal councils have identified alternatives to reduce catch of river herring in their Fishery Management Plans (FMP). The Mid Atlantic Fisheries Management Council's (MAFMC) Amendment 14 of the Atlantic Mackerel, Squid and Butterfish FMP and the New England Fishery Management Council's (NEFMC) Amendment 5 to the Atlantic herring FMP both identified shad and river herring as incidental catch in these directed fisheries and

acknowledged the need to minimize catch of shad and river herring. Both of these plans, through the amendments identified above and subsequent framework adjustments:

- Implemented more effective monitoring of river herring and American shad catch at sea
- Established catch caps for river herring and American shad
- Identified catch triggers and closure areas

Commercial Gear Use in the Hudson River

The current commercial fishery in the Hudson River exploits the spawning migration of both alewife and blueback herring. River herring may be commercially caught in the Hudson River from March 15th to June 15th, dates inclusive. The primary use of commercially caught herring is for bait in the recreational striped bass fishery. An annual commercial Hudson River permit allows use of the following gears: gill nets, scoop/dip/scap nets, seines, fyke nets, and trap nets. Permit holders are required to report effort and harvest to the Department. In response to Amendment 2, more stringent regulations were put into place in 2013. Highlights include the closure of tributaries to nets, net size restrictions for scap nets, and monthly reporting. Changes in regulation are listed in bold in the second column of Table A in Appendix 1.

Fishing effort and commercial gear use has historically been different south of the Bear Mountain Bridge (rkm 75) than in the northern reaches. This is roughly the location of the salt front in the spring. As such, this bridge is used as a demarcation for gear use. The fishery below the Bear Mountain Bridge intercepts fish moving to freshwater spawning areas, while the fishery north of the bridge targets river herring in their spawning aggregation areas.

The intercept fishery is a fixed gill net fishery that occurs in the main-stem river from rkm 40 to rkm 75 (Piermont to Bear Mountain Bridge, Figure 1). In this stretch, the river is fairly expansive (up to 5.5 km) with wide, deep-water (~ six to eight m) shoals bordering the channel. Most fishers in this portion of the fishery choose specific locations within these shoals and sample in the same locations each year. The fishermen generally fish these nets from 12-24 hours per trip. Since 2013, an average of 22 active fishers annually participated in this lower river fixed gill net fishery. Nets are 7.6 to 91 m long, with meshes ranging from 4.4 to 8.9 cm stretch.

Fishermen in the freshwater portion of the fishery, above Bear Mountain Bridge, use drift gill nets to sample the main stem of the Hudson River. This gear is used up to rkm 225 (Castleton) where the river is much narrower (1.6 to 2 km wide). Since 2013, an average of 34 fishers annually participates in this mid river gill net fishery. Nets range in length from 6 to 183 m with mesh size ranges from 3.8 to 8.9 cm stretch. These nets must be tended at all times, and most are fished for less than two hours per trip. Though restricted from use in the 2013 regulation changes, commercial reports indicate fixed gill nets have been used in roughly 19% of gill net trips above Bear Mountain since 2013. We are continuing to work with both the fishermen and law enforcement to resolve this issue.

Scap nets (also known as lift and/or dip nets) is the other major gear used in the freshwater river herring fishery. Prior to 2013, this gear was primarily used in the major river herring spawning tributaries. The current scap/lift net fishery occurs in main-stem river from roughly rkm 90 to rkm 228 (Cornwall-on-Hudson to Port of Albany). Scap/lift nets range in size from 0.28 to 59.7 m^2. On average, 24 fishers have annually reported the use of this gear type since 2013.

It is important to note that many commercial permit holders are recreational anglers taking river herring for personal use as bait or food. Since 2013, an average of 143 gill nets and 95 scap nets permits were sold annually. However, according to the required annual reports only 33% of the permitees actively fished during that same time period (Table 3), and of those that used the commercial gears, roughly half of gill net users and the majority of scap net users reported catches as taken for "personal use" or "personal bait" (Figure 3).

Commercial Landings and License Reporting

Recorded landings of river herring in New York State began in the early 1900s (Figure 4). Anecdotal reports indicate that herring only played a small part in the historic commercial fishing industry in the Hudson River. Total New York commercial landings for river herring include all herring caught in all gears and for both marine and inland waters. From 1995 to the present, the Department has summarized landings and fishing effort information from mandatory state catch reports required for Hudson River marine permits. Full compliance for this reporting started in 2000. All Hudson River data are sent to NMFS and ACCSP for incorporation into the national databases.

Several peaks in landings occur during the time series (Figure 4). The first peak was in the early 1900's (501,438 pounds) followed by a lull until the period prior to World War II when landings peaked a second time in 1935 (274,405 pounds). Post WW II there was another period of low landings until a final peak in 1982 (229,201 pounds). Combined ocean and river landings in New York waters has remained relatively low, with some data gaps, during the rest of the 1980s through present.

Hudson River Landings

Since 1995, landings are separated between the Hudson and other waters (marine). However due to optional participation and minimal enforcement of commercial reporting, any in-river reporting from 1995-1999 is unreliable. It is likely that additional effort was shifted to river herring catches during this time-period than is reported. Moving forward, analyses on in-river landings begin in 2000.

The primary outlet for harvest taken by commercial Hudson River permits is for the in-river bait industry. From 2000 to 2012, nearly all reported commercial river herring landings were split between scap/lift nets (~49% of the catch) and gill nets (~16% drift and ~35% fixed) (Figure 5). From 2000 to 2012, combined landings averaged 15,136 pounds, peaking in 2002 at 20,346 pounds. Post regulation change in 2013, landings declined to roughly 40% of the average from 2000 through 2012. Scap nets accounted for the largest portion of this decline. This is a result of the ban on nets from tributaries, where most commercial scap netting occurred. As the demand for bait has probably not diminished, we expected an increase in landings for the other gears. Though there was a slight increase in drift gill net landings, a big portion of this missing harvest has likely shifted to non-commercial gears, such as hook and line, cast nets, and small scap nets. These personal use gears do not have a mandatory reporting requirement.

Commercial Discards

From 1996 to 2015, river herring were not reported as discards on any mandatory reports

targeting herring in the Hudson River or tributaries. From 2016 to present, an average of 132 pounds of river herring have been reported as discards.

Hudson River Commercial Harvest Rates – Mandatory Reports

Relative abundance of river herring is tracked through catch per unit effort (CPUE) statistics of fish taken from the targeted river herring commercial fishery in the estuary. All commercial fishers fill out monthly mandatory reports. Reports include catch, discards, gear, effort, and fishing location for each trip. CPUEs are calculated as total catch divided by total effort (square yards of net * hours fished), separately by gear type (fixed gill nets, drift gill nets, and scap nets). Annual mean CPUEs are summarized differently based on the location of fishing effort.

Above the Bear Mountain Bridge (rkm 75) and within the spawning reach, drift gill nets and scap nets are the primary gears. In this section of river, fishermen catch fish that are either staging or moving into areas to spawn. Gears are generally not deployed until fish are present. CPUEs for gears above the Bear Mountain Bridge are calculated as total annual catch/total annual effort. Below the Bear Mountain Bridge (rkm 75) and thus below the spawning reach, fixed gill nets are the primary commercial gear. In this section, nets are fished in roughly the same location each year by a consistent group of fishers. These fishers capture fish moving upriver to spawning locations and run size is determined by number (density) of spawners each week as well as duration (number of weeks) of the run. Annual CPUEs in this reach are calculated as the sum of weekly CPUEs to best capture the periodicity of run. Annual efforts and CPUEs for the main commercial river herring gears are shown in Figure 6. Values for drift gill and scap net values in Figure 6 are only for trips above rkm 75, while fixed gill net values are only for trips made below rkm 75.

As shown in Part A of Figure 6, drift gill net CPUEs increased steadily from 2000 peaking in 2014 and have been declining to present. Drift gill net effort declined from 2006 to 2010 and has remained relatively stable from 2010 to present. Due to the opportunistic nature of the upriver fishery (fishers only fish when river herring are present), as well as the large amount of variability in effort within the freshwater spawning reach, we do not believe this dataset to be a reliable annual abundance indicator.

Annual scap net CPUEs and efforts are shown in Part B of Figure 6. Efforts were relatively steady through 2012 but dropped dramatically in 2013 when net use became prohibited in tributaries. Scap net CPUEs declined from 2000 to 2007 but have increased from 2007 to present. Due to significant changes in the fishery due to regulation, we do not think this commercial gear is a reliable relative abundance indicator.

Part C of Figure 6 shows effort and CPUEs for the lower river fixed gill net fishery. Effort in this fishery has decreased steadily since 2000, but the annual sum of weekly CPUEs has been increasing since 2010, peaking in 2014. Because most river herring must pass through this fishery on the way to freshwater spawning reaches and tributaries, it has the best chance at sampling the entirety of the spawning stocks of both species. As such, lower river fixed gill net CPUEs likely provide the best abundance indicator of the three main commercial gears.

Hudson River Commercial Harvest Rates – Monitoring Program

Up until the mid-1990s, the Department's commercial fishery monitoring program was directed at the American shad gill net fishery, a culturally historic and economically important fishery. We expanded monitoring to the river herring fishery in 1996 but remain limited by available manpower and the ability to connect with the fishers. Monitoring focuses on the lower river fixed gill net fishery since we considered it to be a better measure of annual abundance trends as described in the above section.

Data are obtained by observers onboard commercial fishing vessels. Staff record numbers of fish caught, gear type and size, fishing time, and location. Scale samples, lengths and weights are taken from a subsample of the fisher's catch. CPUE is based on gear type and location and is calculated by the method used for summarizing mandatory report data (above).

Since 1996, staff monitored 185 trips targeting river herring (lower river: 149; mid and upper river: 36) (Table 4). Prior to 2012, these trips were sporadic and sample sizes were low, from zero to 11 trips per year. Since 2012, observer trips have become more consistent but because the number of trips is still relatively low, the resulting CPUE is considered unreliable for tracking relative abundance. However, as shown in Figure 7, the commercial monitoring CPUE for fixed gill nets in the lower river follows the same trend as the lower river CPUE from the same gear in the mandatory commercial catch reports (correlation value 0.81, $p < 0.0001$). This is indicative that our monitoring efforts capture trends in the reported fishery, and with increased sample sizes for commercial monitoring, we expect this relationship to improve further. In addition, active monitoring provides the only data on catch composition of the commercial harvest and we consider these data to be useful.

Commercial Harvest Monitoring- Catch Composition, Size and Age Structure

Catch composition in the fixed gill net fishery varies annually, most likely due to small sample sizes and when the samples occurred (early or late in the run) (Table 5). Annual observed landings ranged from 44 to 3,129 fish, with alewives observed more often than blueback herring. The sex ratio of alewives was nearly equal (~ 50:50) in most years; however, female blueback herring were observed more often than male blueback herring most likely due to the size selectivity of gill nets fished.

Mean lengths and weights of dockside subsamples are shown in Figure 8. Power analysis was conducted to determine the minimum sample size required to detect a significant change of 5 mm total length. Sample sizes that did not meet the respective minimum sample size were omitted. There is an increasing trend in total length and no trend in weight for both species. These trends or lack thereof are similar to those observed for both species in the spawning stock survey (Section 3.2.2 below).

Age data for samples collected during the commercial monitoring program were processed and analyzed in the methods described in Appendix 2. In 2012, a subsample of scales collected during on-board monitoring were aged to develop an age-length key. The age-length key was then applied to all unaged samples to assign ages for the commercial fishery. Mean length at age for the 2012 commercial samples was then compared to the mean length at age for fish collected in our fishery independent survey in the same year (Figure 9). As there was little deviation in mean length at age for both species among the surveys, we used the annual age-length keys (see *Age and Repeat Spawn* in Section 3.2.2 below) derived from samples collected during the fishery independent survey to estimate the respective year's commercial fishery age structure beginning

in 2013 continuing to present.

Table 6 shows the age structure for commercial monitoring samples taken from 2012 to 2019. Mean age for sexes of both species has remained stable or slightly increased, which corresponds with the increase in mean lengths during the same time period and is similar to the trends observed in the fishery independent age dataset described in Section 3.2.2.

Long Island, Bronx and Westchester Counties:

As of 2013, commercial river herring fisheries have been closed in the marine and coastal district of NY.

3.1.2 Recreational Fishery

Hudson River and tributaries: The recreational river herring fishery exists throughout the main-stem Hudson River, and its tributaries including those in the tidal section and above the Troy Dam (Mohawk River). Some recreational herring fishers use their catch as food (smoking/pickling). However, the recreational river herring fishery is driven primarily by the need for bait in the recreational striped bass fishery.

In concert with the change in commercial regulations in 2013, new regulations were put into place for the recreational fishery in response to Amendment 2. Regulations for recreational take are found in Table B of Appendix 1. The most significant changes were a creel limit of 10 fish per day or 50 fish per boat, as well as the prohibition of personal net use in tributaries. All 2013 changes are denoted in bold in Table B.

The magnitude of the recreational fishery for river herring is unknown for most years. NYSDEC contracted with Normandeau Associates, Inc. (NAI) to conduct creel surveys on the Hudson River in 2001 and 2005 (NAI 2003 and 2007). Estimated catch of river herring in 2001 was 34,777 fish with a 35.2% retention rate. When the 2001 data were analyzed, NAI found that the total catch and harvest of herring was underestimated due to the angler interview methods. In the 2001 survey, herring caught by fishers targeting striped bass were only considered incidental catch, and not always included in herring total catch and harvest data. Fishers were actually targeting herring and striped bass simultaneously. Corrections were made to the interview process for the 2005 survey and estimated catch increased substantially to 152,117 herring (Table 7). We also adjusted the 2001 catch using the 2005 survey data. The adjusted catch rose to 93,157 fish.

We also evaluated river herring use by striped bass anglers using data obtained from our Cooperative Angler Program (CAP). The CAP was designed to gather data from recreational striped bass anglers through voluntary trip reports. Volunteer anglers log information for each striped bass fishing trip including fishing time, location, bait use, fish caught, length, weight, and bycatch. From 2006 through 2020, volunteer anglers were asked to provide specific information about river herring bait use. Due to the difficulties associated with differentiating between alewife and blueback herring, anglers were only asked to report the catch as river herring. The annual proportion of angler days where river herring were used for bait ranged from 27% (2007) to 58 % (2013,2015,2018) with a mean of 48%. River herring caught per trip varied from 1.5 to 6.7 while herring purchased per trip ranged from 0.63 to 1.7 (Table 7).

In an attempt to estimate recreational river herring harvest, we calculated the total number of herring caught or purchased by striped bass anglers as the estimated number of striped bass trips from a statewide creel survey conducted in 2007 (Connelly and Brown 2009) adjusted annually to reflect the potential change in fishing effort using CAP data multiplied by the annual proportion of angler days using herring in the CAP, multiplied by the number of herring caught or purchased per trip in the CAP. Estimates of river herring use by striped bass anglers from 2007-2020 ranged from 85,249 fish in 2007 to 426,098 fish in 2016 with a mean of 242,713. To put potential recreational herring harvest in context, the average estimated annual recreational harvest from 2013-2020 was 258,281 herring. During the same time period, counts from Black Creek, a small tributary to the Hudson with approximately 1.8 km of available spawning habitat, averaged 324,698 alewives (roughly 117,000 pounds) annually (Figure 10 and Table 8). Black Creek is only one of the 68 primary tributaries to the Hudson River.

This analysis should be interpreted with caution and viewed as potential recreational river herring harvest scenarios. It should also be noted that these estimates are derived from a group of dedicated striped bass anglers who presumably exert more effort than a typical angler and thus we view these estimates as the maximum potential recreational herring harvest. Until a creel survey can be conducted, this is the Department's best estimate of recreational herring harvest.

The number of river herring taken from the Hudson River and tributaries for personal use as food by recreational anglers is unknown but expected to be minimal.

Long Island, Bronx and Westchester Counties: As of 2013, recreational river herring fisheries have been closed in the marine and coastal district of NY.

3.2 Fishery Independent Surveys

3.2.1 Spawning Stock Surveys – Hudson River

Haul Seine Survey

In 1987, the Department added river herring sampling to the existing American shad and striped bass spawning stock survey. Sampling occurred sporadically and when time allowed. From 1987 to 1990, two small mesh (9.5 mm) beach seines (30.5m and 61m) were used with limited success. In 1998, the Department specifically designed a small haul seine (91 m) with an appropriate mesh size (5.1 cm) to target river herring. Similar to the gear design for the American shad and striped bass seine survey to minimize size and age bias (Kahnle et al. 1988), the Department designed the herring seine to capture all sizes present with the least amount of bias. The current herring haul seine design consists of two 46 m long by 3.7 m deep wings attached to a round, center-located bag measuring 1.2 meters in diameter and 3.7 m long. The entire net is 5.08 cm stretch mesh made of twisted nylon twine. The top float line includes fixed foam floats every 0.6 m and fixed chains to the lead line (bottom of seine) every 0.75 m.

To meet the requirements outlined in Amendment 2 (ASMFC 2009) for the mandatory fishery-independent monitoring programs, in 2012 New York established the river herring spawning stock survey. The objectives of the survey are to evaluate species, size, and sex composition of spawning river herring; and then develop the methodology to use the gear to perform an annual

assessment of the Hudson River's river herring spawning stock. We set a sampling target of four sample days per week (March 15 to June 15). We targeted a minimum of five beaches to be sampled each day. Data were used to evaluate sample sites for future sampling use as well as collect spawning adult river herring in the area.

In 2012, we sampled sites in the river from the Tappan Zee (rkm 45) to Albany (rkm 232) (Figure 1). Despite much effort in 2012, no river herring were caught in the southern part of the river from Poughkeepsie south to the Tappan Zee. These areas were dropped in 2013, and we pared down the sampling area to the mid and upper river sections where river herring were most readily caught. Currently, we focus each sampling day of the week on one river reach from Kingston (rkm 136) to Albany (rkm 232) (Figure 1). Reaches are broken down as follows: Kingston (rkm 136-169), Catskill (rkm 170-190), Coxsackie (rkm 191-213), and Albany (rkm 214-232). Within each reach, we randomly selected sites from a map of all known beaches within the Hudson River Estuary. After scouting, we removed any sites from the list that no longer had beaches or had major sampling obstructions. We currently sample 15 fixed sites spread throughout the four reaches.

After each haul, technicians examine each fish for species, gender, and spawning condition. We take a ten fish subsample of each gender and species and measure total length, weight, and obtain a scale sample. When possible, we measure an extra 30 fish from each sex and species for each sampling event. All other incidental catch is tallied by species; we measure and remove scale samples from sport fishes.

In-stream Fish Counter

In 2013, we conducted a pilot study using an in-stream fish counter in Black Creek. Black Creek is a small tributary located at rkm 135, just south of Kingston, NY and has a known river herring spawning run. The primary objective was to determine if a fish counting device was an appropriate method to collect absolute abundance data for river herring in small tributaries. Our secondary objectives were to identify when river herring migrate into tributaries and identify parameters that may influence those migrations (i.e. moon phase, water level, water temperatures).

The study design consisted of a stream wide weir to guide river herring through a Smith Root SR-1601® multichannel fish counter. NYSDEC staff built the counting head using four-inch PVC tubes stacked in two rows of four, forcing fish through one of eight individual counting tubes. We installed the counter system at the end of March each year, close to the head of tide, and it remained in place until the end of May. Staff attempted to visit the counter on a daily basis. During site visits, technicians recorded fish counts on the counter system, along with any applicable environmental observations, such as weather conditions, temperature, and water level. Once the daily count was recorded, the counter was reset to zero. We also conducted multiple visits during the same day in order to compare day versus night migrations of alewife into the tributary. The majority of the migration occurs at night similar to observations of other state agencies utilizing fish counters to obtain abundance estimates. Additionally, we installed a video camera system in 2014 to verify counts and create an accurate correction factor. We are currently analyzing video footage to assess the accuracy of the electronic counter and develop an appropriate correction factor.

Monitoring of Black Creek has continued on an annual basis since 2013 and annual count data

are reported in Table 8. Historic evidence shows the spawning run in Black Creek to be exclusively made up of alewife (Schmidt and Lake 2000). This has been verified in all years of monitoring, as all mortalities and all live captured river herring at or near the weir were identified as alewife. The annual count data from Black Creek is used as ancillary data to support trends identified in the relative abundance indices described in section 3.2.2 and provide a reference for landings in the commercial and recreational fisheries (Figure 10 and Table 8).

3.2.2 Hudson River Spawning Stock - Characteristics

Annual Catches

Prior to 2012, the intermittent effort (n-hauls) expended to catch river herring resulted in relatively low and variable catches (Table 9). Since 2012, targeted river herring sampling resulted in consistent hauls and increased catches.

Since 2012, alewife catches have been on average 69.6% male and 30.4% female (Figure 11). The high ratio of male alewives may indicate a possible sex bias in the sampling technique for alewives. We suspect that males either remain out in the main river close to shore whereas most female alewives could be further offshore, unavailable to our gear or may be staging near tributary entrances. Mid-Hudson tributary sampling conducted by Schmidt and Lake (2000), as well as our own effort (see above, *In-stream Fish Counter*), resulted in more equal sex ratios.

Sex ratios of blueback herring have been more even. On average, blueback herring consisted of 41.3% males and 58.7% females (Figure 11). We suspect that bluebacks may be more susceptible to our gear because they prefer to spawn in shallow shoals of the main-stem river.

Relative Abundance Indices

In 2012, exploratory sampling was conducted to identify beaches that we could sample and catch adult river herring on a consistent basis. Based on those results, we have focused sampling efforts between the Kingston (rkm 146) and Albany (rkm 223) reaches. We are currently exploring the most appropriate method to calculate relative abundance indices for adult river herring. We need additional years of data to be able to identify any potential biases in collection protocols or environmental conditions that may influence catches. Once an appropriate method is identified and we have an adequate time series of data, we propose to use the adult relative abundance index as sustainability target.

Growth

We examined growth characteristics using the Von Bertanlanffy model (Ricker 1975). This model uses the annual age and associated lengths of aged samples from the fishery independent survey. Samples from the commercial fishery were not included due potential size and sex selectivity of the gears. We developed preliminary estimates of growth on an annual basis, by sex and species, and to include all year-classes for the time period 2012-2018. These provide growth characteristics of each species and were used to inform yield-per-recruit models described below. The resulting growth model outputs are reported in Table 10.

Mean Total Length and Weight

Mean total length and weight of fish has been calculated when adequate sample sizes occurred (Figure 12). Prior to 2008, most sample sizes were relatively small and thus not reliable. Since 2008, mean total length of male alewife has increased to present. Mean total length of female alewife has also steadily increased since 2008. Mean total length of blueback herring has increased for both sexes from 2009 to the present. Mean weights of alewife males have remained stable while females have been increasing. Male blueback herring mean weights were stable from 2009 to 2014 but have increased to present while female blueback herring mean weights have been steadily increasing since 2009.

Maturity

Maturity was estimated from age at first spawn, subtracting the number of spawning marks from the age of each fish. We then calculated maturity schedule as percent mature at age present in the river for each species and sex using all sampled age classes. As with growth rates, annual variations in recruitment and fishing mortality have significant impacts on maturity schedules. To address these potential problems, we will compare inter-annual maturity estimates with those calculated by year class once enough long-term age and spawning mark data are available.

Age data from 2012-2019 indicate that male alewives begin to spawn at ages three to four and are fully mature by age five while female alewives begin to spawn at ages three to four and fully mature by age six (Figure 13). Blueback herring begin to spawn at ages two to three and the majority reach full maturity by age five (Figure 13).

Age and Repeat Spawn

Through training sessions and workshops with aging experts such as the Massachusetts Division of Marine Fisheries and other Atlantic Coast agencies (ASMFC 2014.), we developed criteria for determining what constitutes an annulus and spawning mark in Hudson River fish. (Details in Appendix 2). We did not use prior accepted aging methods such as Cating (1953, previously used for American shad) or Marcy (1969, used for river herring) due to their reliance on transverse grooves to estimate annuli location.

We also revised the scale selection and preparation protocols. For each catch event, we took scale samples from random subsamples of ten individuals of each sex and species. We removed scales as described above in the fisheries dependent methods, from the left side of the fish directly below the dorsal fin above the midline (Rothschild 1963; Marcy 1969; Hattala 1999) and placed them in an individually identified envelope. In the lab, technicians numbered scale envelopes and entered them into a database along with the associated sampling program (fishery independent or dependent) data: gear type, species, sex, and length. As annual sample sizes were large for most projects in this study, we needed to accurately determine ages of a sub-sample of fish collected. We followed Ketchen (1950) method of selecting a stratified sub-sample of fixed numbers of fish aged per 10 mm length bin. In 2012 and 2013, we separated the scale samples by sampling program, species, and sex. Next, we randomly selected 30 fish per 10 mm length bin. All fish were aged when there were fewer than 30 fish in a length bin. Due to time restraints and based on more recent literature (Coggins et al. 2013), we have been examining 10 fish per length bin since 2014.

The sub-sample of aged fish were used to developed annual age-length keys for each species and

sex (Loesch 1987; Devries and Frie 1996; Davis and Schultz 2009). Sex-specific age-length keys were then used to estimate numbers at age of each sex and species for the entire sample for each year. The resulting estimated numbers at age were used to calculate mean length at age as well as mortality estimates reported in *Mortality Estimates* below.

Age and repeat spawn data for both species of river herring are reported in Tables 11 and 12. From 2012 to 2019 during our fisheries independent sampling, we collected 10,032 scales samples from alewives and assigned ages to a stratified random subsample of 1,750 scale samples. Female alewives ranged from age two to ten with zero to five repeat spawn marks and ranged from 68% to 36% virgin fish. Since 2012, mean age of female alewives has been stable to slightly increasing. Male alewives ranged two to eight years of age with zero to five repeat spawn marks. Male alewives ranged from 82% to 51% virgin fish (Figure 14). Mean age of male alewives has been stable to slightly increasing since 2012.

From 2012 to 2019, we collected 4,250 scale samples from blueback herring and assigned ages to 1,263 of those samples. Female blueback ages ranged from two to nine with zero to five repeat spawn marks. Female bluebacks ranged from 79% to 42% virgin fish. Male bluebacks ranged in age from two to six with zero to three repeat spawn marks and ranged from 92% to 59% virgin fish. Mean age of male and female bluebacks has remained stable since 2012.

Alewife males and females are on average larger than blueback males and females of the same age. Max total lengths and mean length at age of both species are approaching or have exceeded those reported in Greeley 1937. Since 2012, mean length at age for both species across all ages has been stable. Along with stable mean length at age, the overall age structure for both species has expanded with increased repeat spawning occurrence. The increase in the occurrence of repeat spawning marks suggests a higher survival rate during both post-spawn emigration and during ocean residency (Figure 14).

Based on recommendations in the recent American Shad Benchmark Stock Assessment (ASMFC 2020) and the anticipated recommendation from the upcoming River Herring Benchmark Stock Assessment in 2023, we will be transitioning from scales to otoliths for production aging. During this transition period, we will age paired scales and otoliths over the next few years before transitioning fully to otoliths.

Mortality Estimates

Total instantaneous mortality rates were calculated on an annual basis since 2012 for age data and 2009 for repeat spawn data using a bias-correction Chapman and Robson mortality estimator described in Smith et al. (2012).

To be consistent with the methods used in the 2012 Benchmark Stock Assessment for River Herring, the age of full recruitment was the age of highest abundance and there had to be at least three ages or spawning marks to be included in the respective analyses (ASMFC 2012).

Mortality estimates for both species were calculated using age and repeat spawn data independently (Table 13, Figure 15). Mortality estimates derived from age data for alewives declined or remained stable from 2012-2014. In 2015 and 2016, mortality estimates increased dramatically; however, this increase was likely due to a large year class moving through the fishery resulting in over dispersion of older fish and is further compounded by fewer age three

and age four fish observed in 2015 and 2016. In 2017, mortality estimates declined to previous levels and have remained stable to present. Fewer age three- and four-year-old fish may be an artifact of major weather events that severely impacted the Hudson River; Hurricane Irene and Tropical Storm Lee in 2011 and Hurricane Sandy in 2012. The impact on the survival of YOY and yearling river herring resulting from these storm events is unknown; however, recent data suggest the extent of their impact was limited.

Blueback herring age-based mortality estimates remained stable or declined since 2012 (Table 13, Figure 15). In the previous plan, both sexes of blueback herring were comprised of primarily three- and four-year-old fish. Recent data indicates continued expansion of the age structure with increased occurrences of both older fish and increased occurrences of repeat spawning marks (Tables 11 and 12).

Mortality estimates have been derived from repeat spawning data since 2009 and generally followed the same trends as estimates derived from age data. Mortality estimates in recent years remained stable or declined (Table 13, Figure 15).

In most instances, the mortality estimates based on spawning marks were higher than those calculated from ages. This may be a result of the age-based method using the most abundant number at age as age at full recruitment. In doing so, we may include ages of the population that may not actually be fully recruited. However, trends between the two estimation methods follow similar trends and annual estimates are not significantly different ($p=0.63$).

Spawner-per-Recruit (SPR)

Following methods described in Section 2.5.2 of the recent ASMFC American Shad Benchmark Stock Assessment (ASMFC 2020), we used a modified Thompson-Bell spawner-per-recruit model to develop a total mortality ($Z_{40\%}$) sustainability target for female alewife and blueback herring. Model inputs were derived from Hudson specific alewife and blueback herring empirical data such as maturity schedule, weight-at-age and natural mortality (Table 14). The three-year average total mortality estimates for each species will be used to evaluate against the sustainability thresholds.

The resulting $Z_{40\%}$ sustainability thresholds for alewife females is 1.26 and 1.19 for female blueback herring (Table 15 and Figure 16). These are new sustainability thresholds and not included in previous plans.

3.2.3 Spawning Stock Surveys – Long Island

Young (2011) sampled alewife in the Peconic River 32 times throughout the spawning season in 2010. Sampling occurred by dip net just below the second barrier to migration at the lower end of a tributary stream. A rock ramp fish passage facility was completed at the first barrier near the end of February 2010. The author collected data on total length and sex and estimated the number of fish present based on fish that could be seen below the barrier. Peak spawning occurred during the last three weeks of April. The minimum estimate of run size was 25,000 fish and was the total of the minimal visual estimates made during each sample event. Males ranged from 243-300 mm with a mean length of 263 mm. Females ranged from 243-313 mm with a mean of 273 mm. Byron Young's sampling has continued annually since 2011. There have also

been additional video monitoring and alewife tagging studies, with estimations of Peconic River run size (https://seatuck.org/volunteer-river-herring-survey/).

3.2.4 Volunteer and Other River Herring Monitoring

The Seatuck Organization, in collaboration with the NYS DEC, Peconic Estuary Partnership, Long Island Sound Study, South Shore Estuary Reserve, and others, runs annual citizens alewife survey (https://seatuck.org/volunteer-river-herring-survey/). The survey incorporates citizen volunteers into the collection of data on temporal variation and physical characteristics associated with spawning of river herring in tributaries. These data were not provided by the fishery dependent and independent sample programs discussed above. The volunteer programs also bring public awareness to environmentally important issues.

Long Island Streams

The South Shore Estuary Reserve Diadromous Fish Workgroup began a volunteer survey of alewife spawning runs on the south shore of Long Island in 2006, which is now run by the Seatuck Organization, as noted in the paragraph above. The survey is designed to identify alewife spawning in support of diadromous fish restoration projects. The Diadromus Fish Workgroup evaluates current fish passage projects and sets a baseline of known spawning runs. Data are available on the Seatuck organization website (https://seatuck.org/volunteer-river-herring-survey/).Monitoring takes place from March through May. Data indicated that alewife use multiple streams in low numbers. The first permanent fish ladder on Long Island was installed in 2008 on the Carmans River. Information gathered during this study will aid in future construction of additional fish passage (Kritzer et al. 2007a, 2007b, Hughes and O'Reilly 2008). Byron Young continues to monitor alewife, mostly in the Peconic River. In 2021, there was an estimated 29,000 fish alewife run in the Peconic River, via visual estimate. The last fish was caught on May 20, 2021 (B. Young, retired, NYS DEC, personal communication),
In addition to the SSER, other interested individuals have also monitored Long Island runs (see Appendix Table A). Anecdotal data provides valuable information on tracking existing in-stream conditions, whether streams hold active or suspected runs, interaction with human land uses, and suggestions for improvement (L. Penney, Town of East Hampton, personal communication). A rock ramp was constructed around the first barrier to migration on the Peconic River in early 2010 (B. Young, retired, NYS Dept of Environmental Conservation, personal communication). The Seatuck Environmental Association set up an automated video counting apparatus at the upriver end of this ramp. A video can be viewed on their website at https://www.seatuck.org/index.php/fish-counting

3.2.5 Young-of-the-Year Abundance

Since 1980, the Department has produced an annual measure of relative abundance of YOY alewife and blueback herring in the Hudson River Estuary. Although the program was designed to sample YOY American shad, it also provides data on the two river herring species. Blueback herring appear more commonly than alewife throughout the time series. In the first four years of the program, sampling occurred river-wide (rkm 0-252), bi-weekly from August through October, beginning after the peak in YOY abundance occurred. The sampling program was altered in 1984 to concentrate in the freshwater middle and upper portions of the estuary (rkm

88-225), the major nursery area for young American shad and river herring. Timing of sampling was changed to begin in late June or early July and continue biweekly through late October each year. Gear is a 30.5 m by 3.1 m beach seine of 6.4 mm stretch mesh. Collections are made during the day at 28 fixed sites in nearshore habitats spanning four reaches of the freshwater portion of the river. Catch per unit effort is expressed as the annual geometric mean of fish per seine haul for weeks 26 through 42 (July through October). This period encompasses the major peak of use in the middle and upper estuary.

From 1980 to 1998, the Department's geometric mean YOY annual index for alewife was low, with only one year (1991) having over one fish per haul. Since 1998, the index has generally increased through 2011, and remained stable at roughly one fish per haul since 2013 (Figure 17).

From 1980 through 1994, the Department's geometric mean YOY annual index for blueback herring averaged about 24 fish per haul, with only one year (1981) dropping below 10 fish per haul (Figure 17). After 1994, the mean dropped to around 14 fish per haul. The largest index value for the time series occurred in 2014, which was just over 50 fish per haul.

The underlying reason for the wide inter-annual variation in YOY river herring indices is not clear. The increased inter-annual variation in relative abundance indices of all three alosines may indicate a change in overall stability in the system. Further investigation into temporal and environmental variables that may contribute to this high variability is necessary. By the next SFMP (2027), we will evaluate different standardized models to best account for the influence of covariates, such as salinity, water temperature, and sampling week on YOY catches.

4 PROPOSED FISHERY CLOSURES

4.1 Long Island, Bronx County and Westchester County

Limited data that have been collected for Long Island river herring populations are not adequate to characterize stock condition or to choose a measure of sustainability. Moreover, there are no long-term monitoring programs in place that could be used to monitor future changes in stock condition.

For the above reasons, New York State proposes to continue a closure of all fisheries for river herring in Long Island streams and in the Bronx and Westchester County streams that empty into the East River and Long Island Sound as outlined in previous SFMP (Eakin et al. 2017).

4.2 Delaware River

We have very limited data that suggest river herring occur in New York waters of the Delaware River. New York State proposes to continue the closure of fishing for river herring in New York waters of the Delaware River as outlined in the previous SFMP (Eakin et al. 2017). This closure conforms to similar closures of the Delaware River and Bay by the states of Pennsylvania, New Jersey, and Delaware.

5 PROPOSED SUSTAINABLE FISHERY

5.1 Hudson River and Tributaries

New York State proposes to continue a restricted fishery in the main-stem Hudson River coupled with a continued partial closure of the fishery in all tributaries (see Appendix 1). We do not feel the current data warrant a complete closure of all fisheries. We propose that the restricted fishery would continue for an additional five years concurrent with annual stock monitoring. Sustainability targets will be set using juvenile indices and a new total mortality threshold for female alewife and blueback herring. We will continue monitor, but not yet set targets for mean length and mean length at age from fishery independent spawning stock sampling and CPUE in the commercial fixed gill net fisheries in the lower river below Bear Mountain Bridge. We will also monitor age structure and frequency of repeat spawning. Stock status will be evaluated during and after an additional five-year period and a determination made whether to continue or change restrictions.

6 PROPOSED MEASURES OF SUSTAINABILITY

6.1 Targets and Thresholds

Total Mortality

We propose to set new sustainability thresholds for female alewife and blueback herring total mortality (Z) using a modified Thompson-Bell yield per recruit model with Hudson stock specific data from the time period of 2012 through 2018. The three-year average total mortality estimate for each river herring species will be used to evaluate exceedance of the total mortality target. The resulting sustainability thresholds are 1.26 and 1.19 for female alewife and blueback herring, respectively (Figure 16).

Juvenile Indices

We propose a continuation of sustainability targets for juvenile indices using data from the time period of 1983 through 2015 for both species. We will use a more conservative definition of juvenile recruitment failure than described in section 3.1.1.2 of Amendment 2 to the ASMFC Interstate Fisheries Management Plan for Shad and River herring (ASMFC 2009). Amendment 2's definition is that recruitment failure occurs when three consecutive juvenile index values are lower than 90% of all the values obtained in the base period. We will be more conservative and use a 75% cut off level. The resulting sustainability target value is the 25th percentile of the time series, such that three consecutive years with index values below this target would trigger management action. The target for alewife is 0.36 and the target for blueback herring is 7.53 (Figure 17).

6.1.1 Management Actions

New York State will take immediate corrective action if the recruitment failure limit is met for three consecutive years or if total mortality exceeds the thresholds for three consecutive years. Potential management actions may include but are not limited to: area closures, gear restrictions, and permit fee restructuring. Specific management actions for each potential action may include

but are not limited to:

Area closures: Prohibit commercial fishing above the Bear Mountain Bridge
Rationale: The majority of spawning occurs above the Bear Mountain Bridge; therefore, closure of this area would reduce harvest of spawning river herring.

Gear restrictions: Eliminate angling as a means for commercial harvest
Rationale: Regulations implemented in 2013 prohibited the use of nets in all tributaries to the Hudson River; however, angling for commercial purposes is still permitted and currently not quantifiable but suspected to be a significant source of harvest. Eliminating this gear would reduce harvest of spawning river herring.

Permit fee restructuring: Permit fees were set in the early 1900s and have not changed to date.
Rationale: Current permit fees allow access to commercial gears at a nominal cost (e.g. .05 cents per net foot for a gill net up to 600 feet). Accounting for inflation, the cost per net foot would be $1.58 per foot today. Permit fee restructuring would dissuade recreational fishers from using commercial gears to avoid the 2013 implementation of the recreational 10 fish creel limit.

Corrective actions will remain in place until the juvenile index value is above the juvenile recruitment failure level set in Amendment 2 to the ASMFC Interstate Fisheries Management Plan for Shad and River herring for three consecutive years and/or total mortality is below the total mortality thresholds for three years.

6.2 Sustainability Measures

There are several measures of stock condition of Hudson River herring that can be used to monitor relative change among years. However, these measures have limitations (described below) that currently preclude their use as targets. These include frequency of repeat spawning, mean length, and mean length at age in fishery independent samples as well as catch per unit effort (CPUE) in the reported commercial harvest. We propose to monitor these measures in concert with the sustainability targets and thresholds to evaluate consequences of a continued fishery.

Mean Length and Mean Length at Age

Mean total length and mean length at age reflects age structure of the populations and thus some combination of recruitment and level of total mortality. Mean total length and mean length at age of both river herring species in the Hudson River system have been increasing since sampling efforts increased and became consistent in 2012. Max total lengths and mean length at age of both species are approaching or have exceeded those reported in Greeley (1937). The increases in mean length and mean length at age are indicative of reduced mortality both within river and during their ocean residency. However, the impact of bycatch in ocean fisheries is largely unknown and not solely controlled by New York State to effect a change. We propose to continue monitoring mean total length and mean length at age during the proposed fishery.

Catch per Unit Effort in Report Commercial

We suggest that CPUE values of the reported harvest reflect general trends in abundance. However, annual values can be influenced by changes in reporting rate and thus we do not feel that CPUE should be used as a target at this time. Once we have an adequate time series of age data, we will attempt to validate the commercial CPUEs with our relative abundance surveys (YOY and adult relative abundance indices) following methods described by Hattala and Kahnle (2007).

Repeat spawning

We will continue to monitor the frequency of repeat spawning. Once an adequate time series of data is collected, we will investigate appropriate methods to develop a repeat spawning-based benchmark and use that benchmark as a sustainability target in future sustainable fishery management plans.

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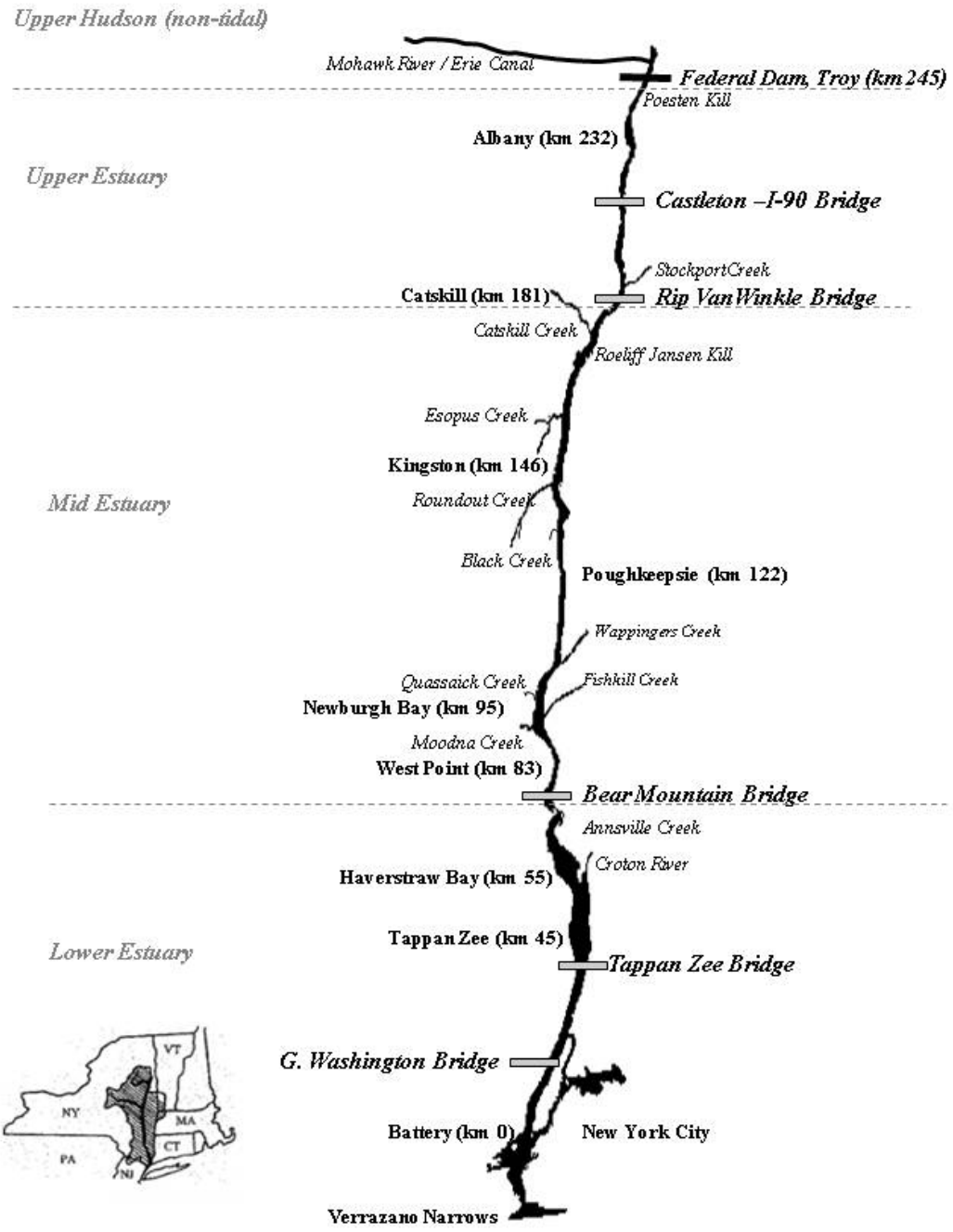


Figure 1. Hudson River Estuary with major spawning tributaries for river herring.

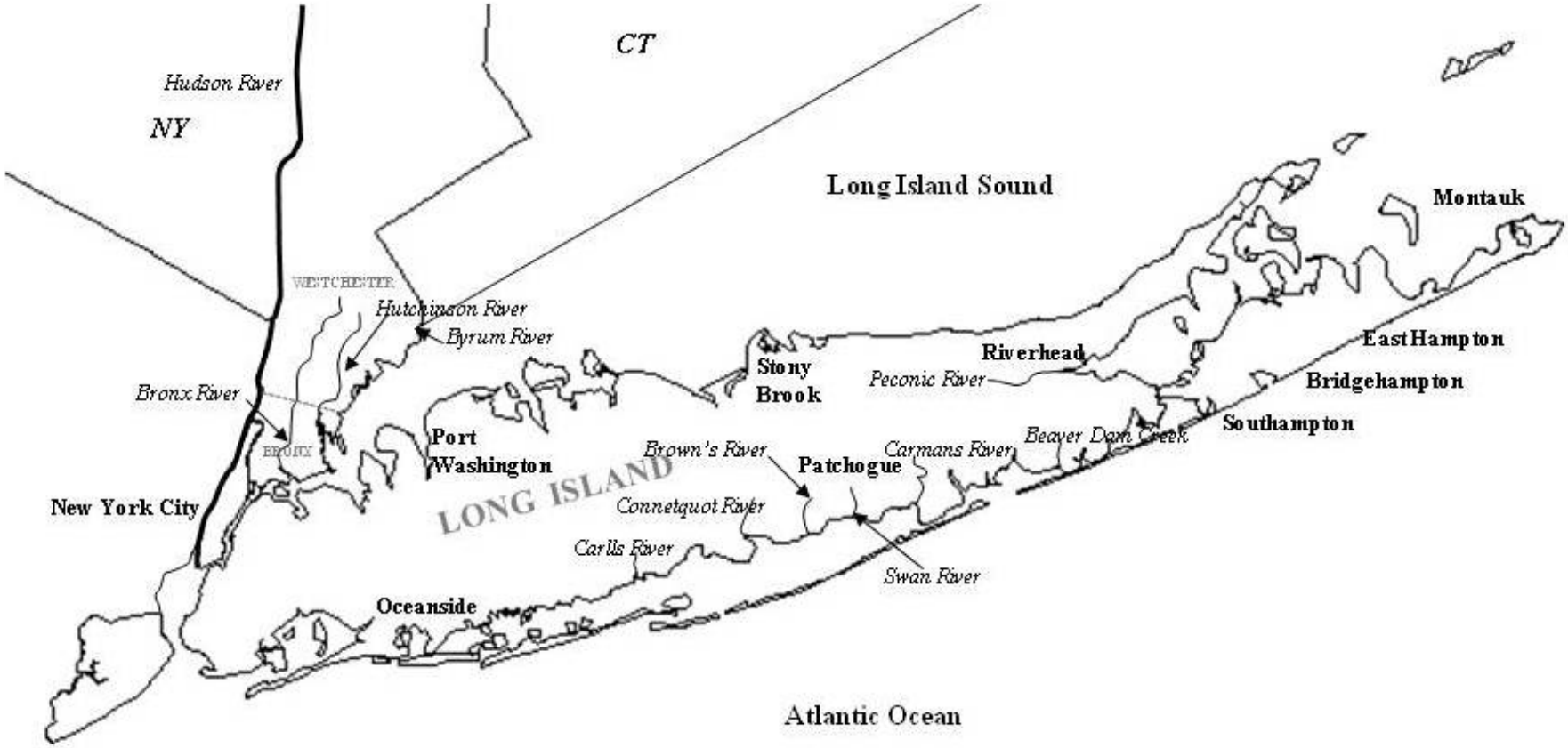


Figure 2. Long Island, Bronx and Westchester Counties, New York, with some river herring (primarily alewife) spawning streams identified.

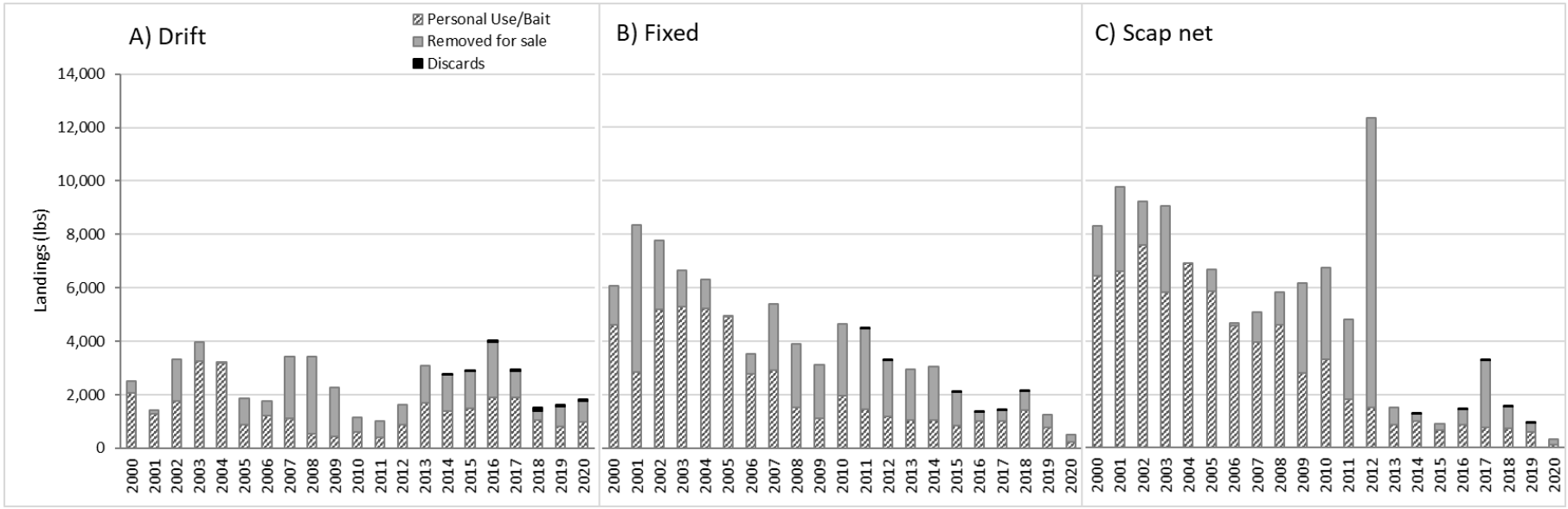


Figure 3. Dispositions of commercially caught river herring as reported in mandatory trip reports.

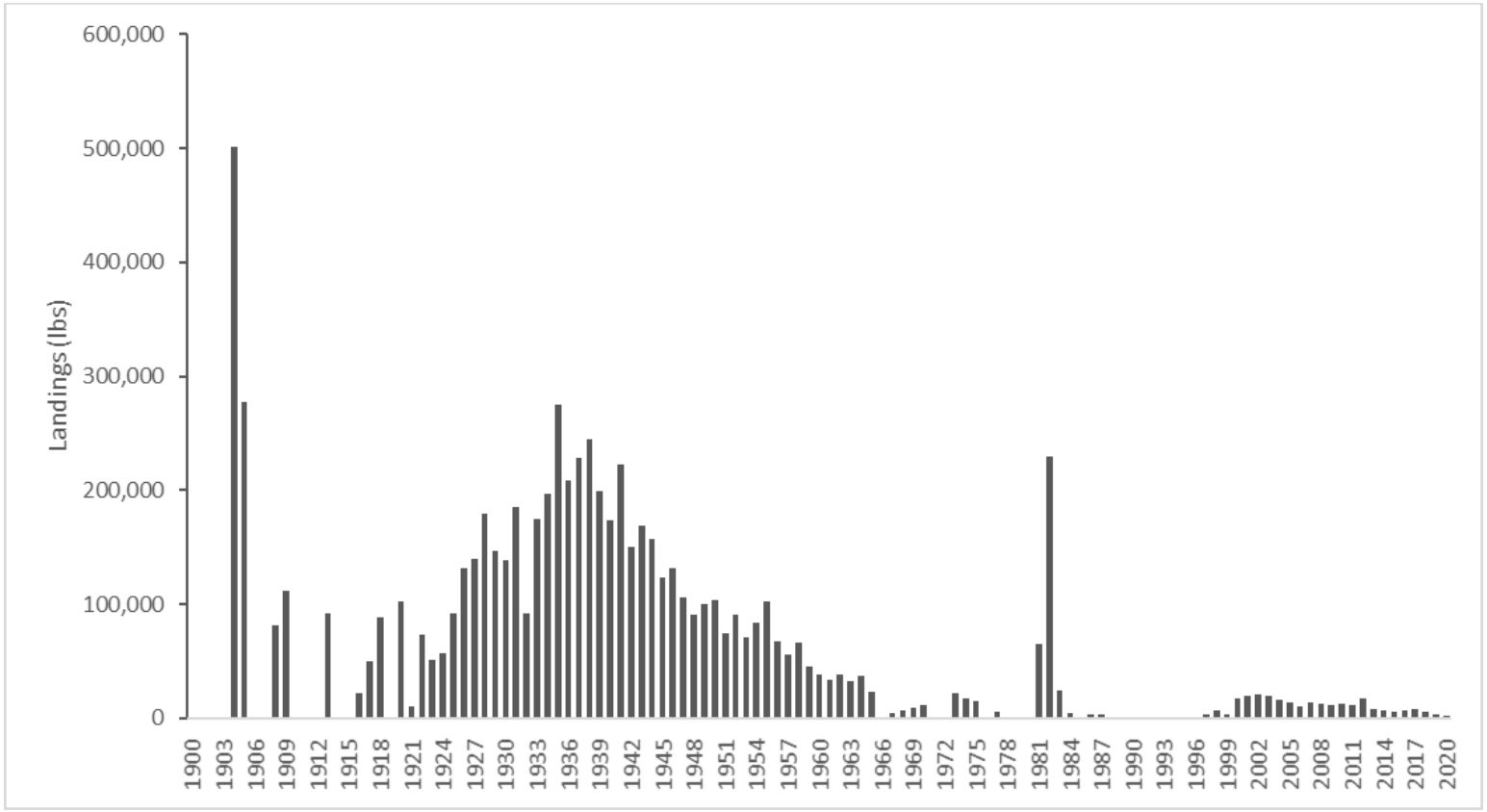


Figure 4. River herring landed in New York waters.

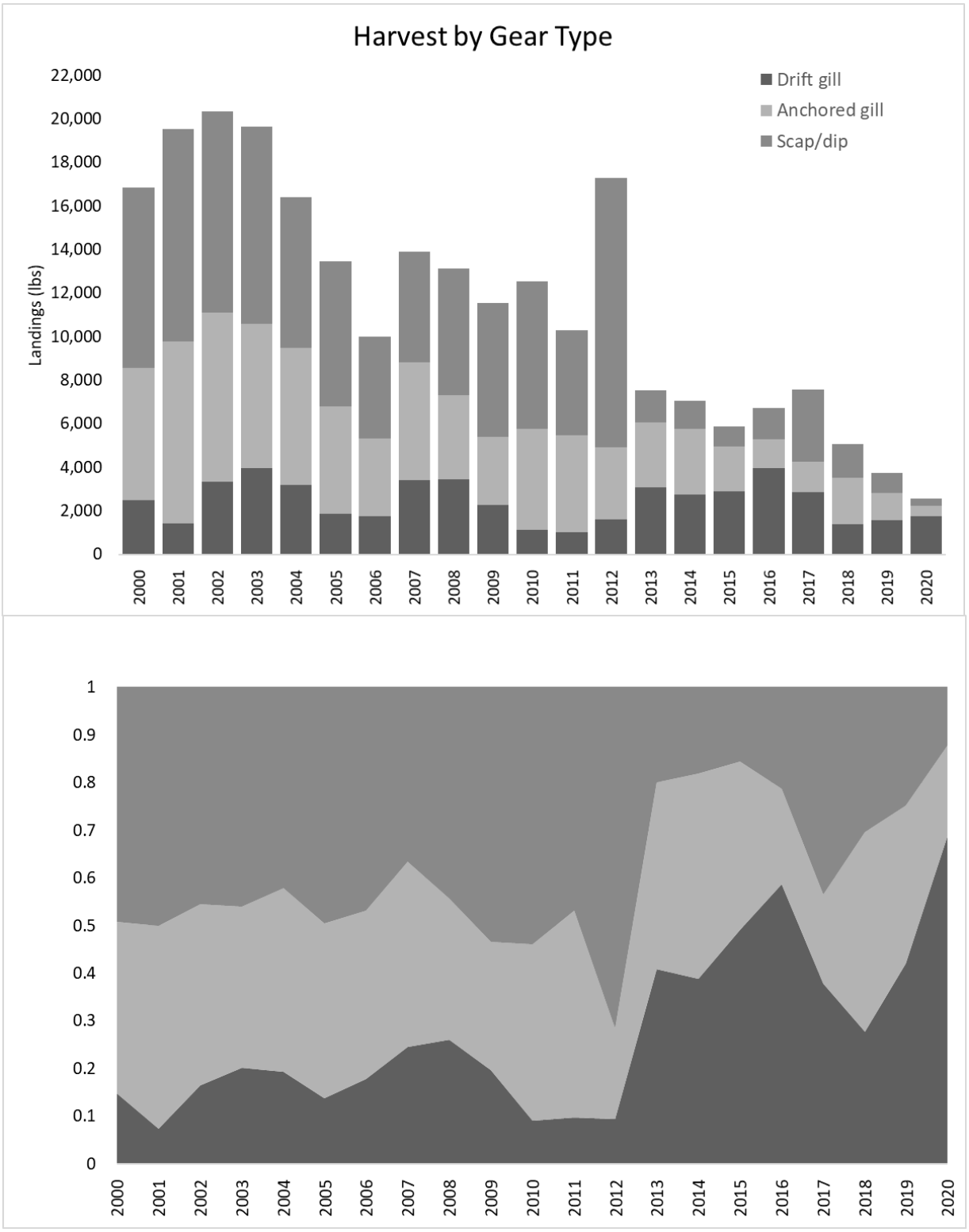


Figure 5. (Top) Annual total landed pounds of river herring separated by gear type. Catch includes targeted river herring trips only. (Bottom) Percent landed by gear type.

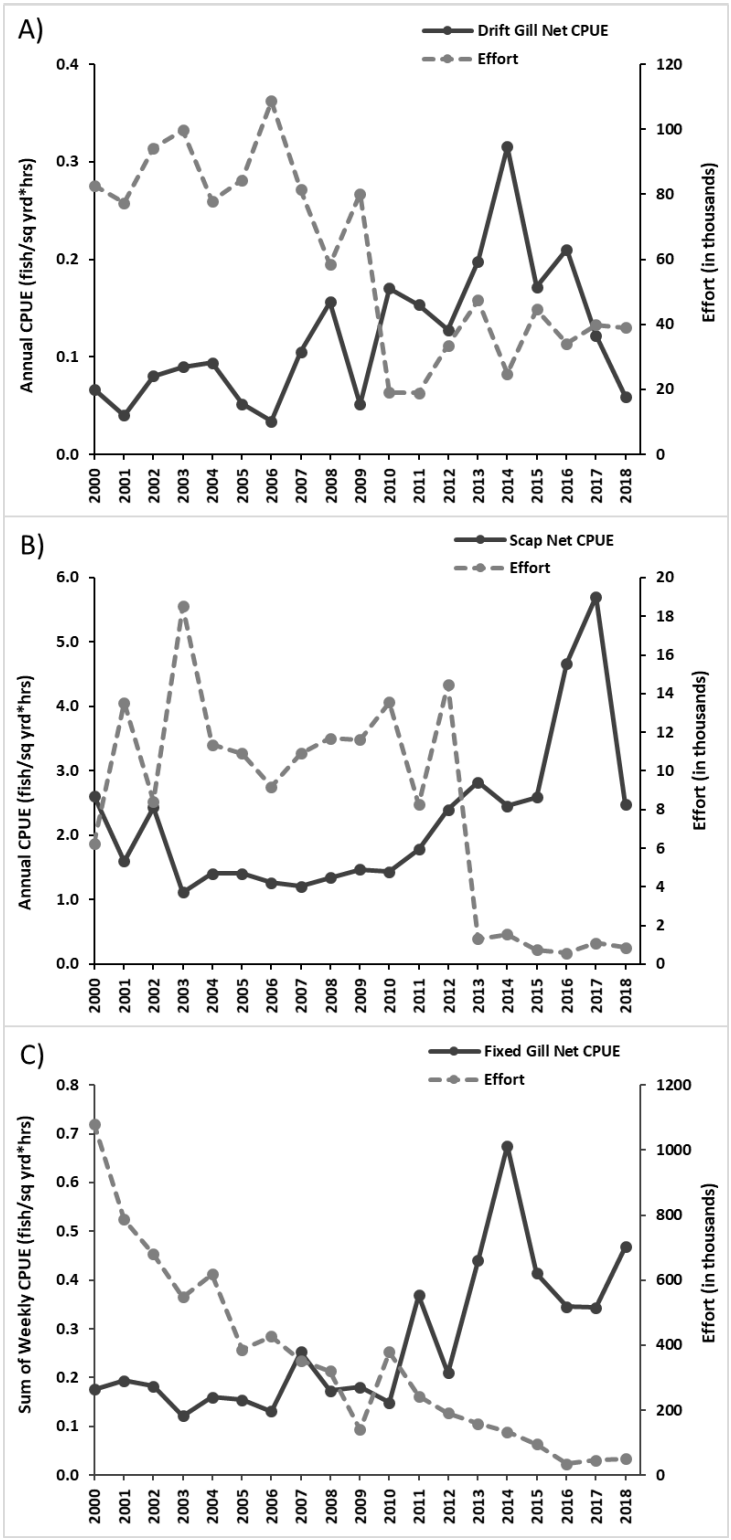


Figure 6. Efforts (sq yd net area * hours) and CPUEs from mandatory commercial reports. A) Drift gill net fishery above rkm 75; CPUE is total catch/total effort. B) Scap net fishery above rkm 75; CPUE is total catch/total effort. C) Fixed gill net fishery below rkm 75; CPUE is the sum of weekly catch/weekly effort.

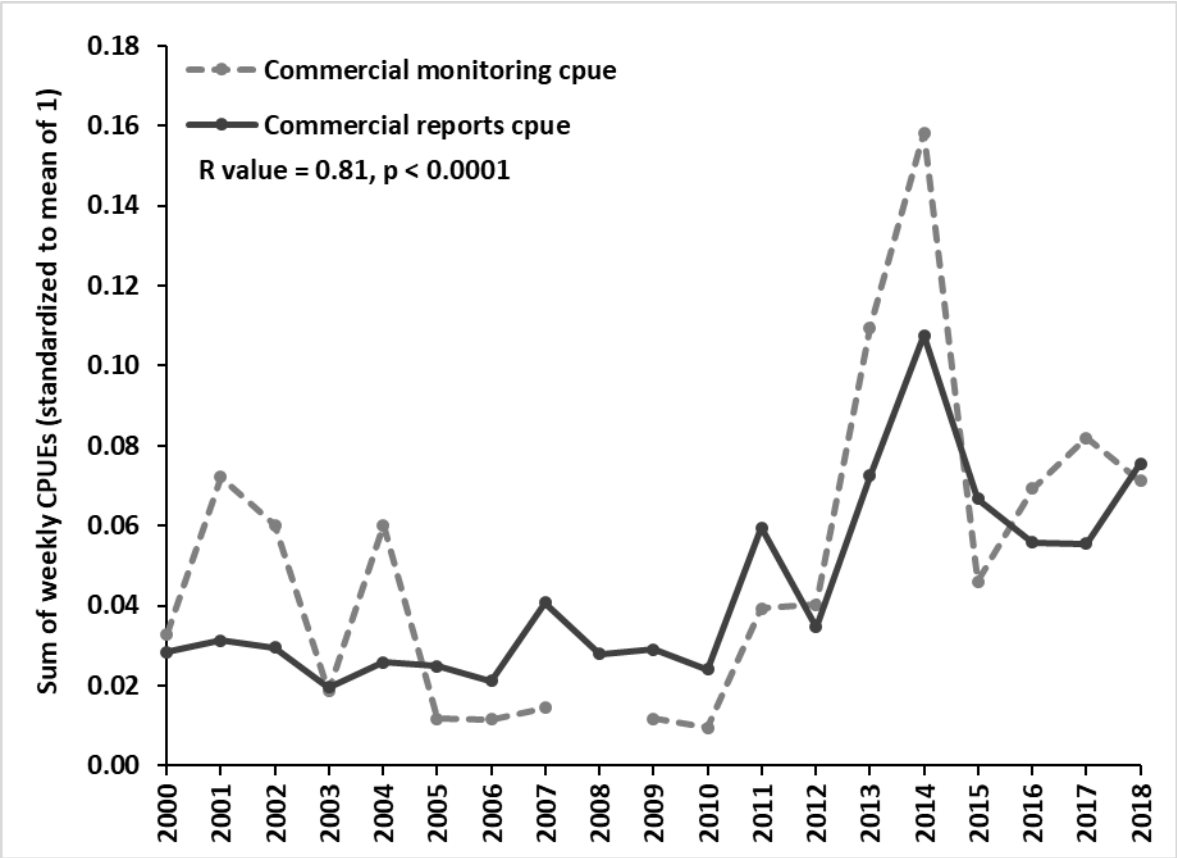


Figure 7. Comparison of the sum of weekly CPUEs calculated from commercial monitoring and mandatory commercial reports of the fixed gill net fishery below the Bear Mountain Bridge (rkm 75).

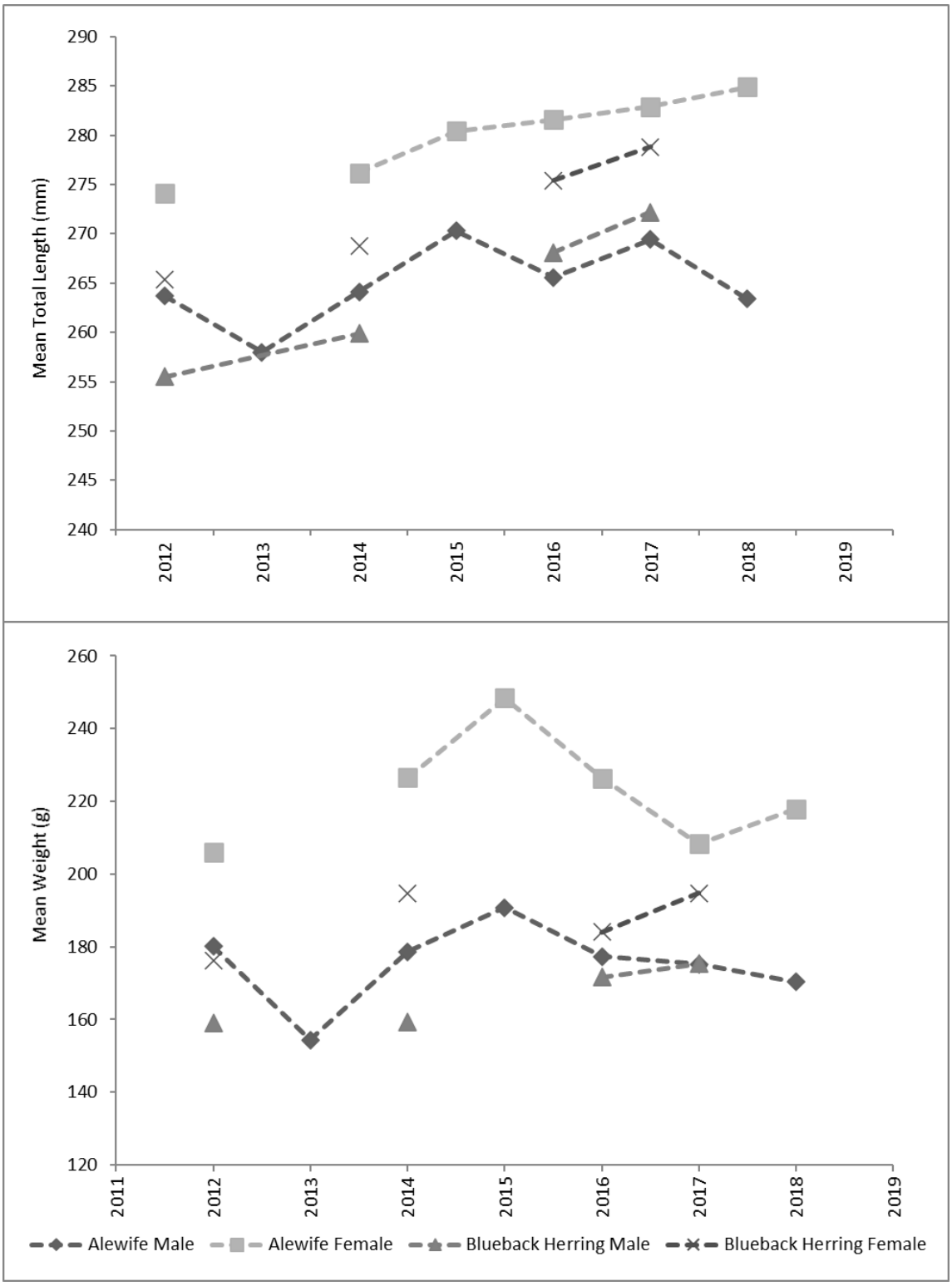


Figure 8. Mean length and weight of river herring collected in fishery dependent sampling in the commercial fishery in the Hudson River. Years omitted when minimum sample size not met to detect a significant change of 5 mm total length.

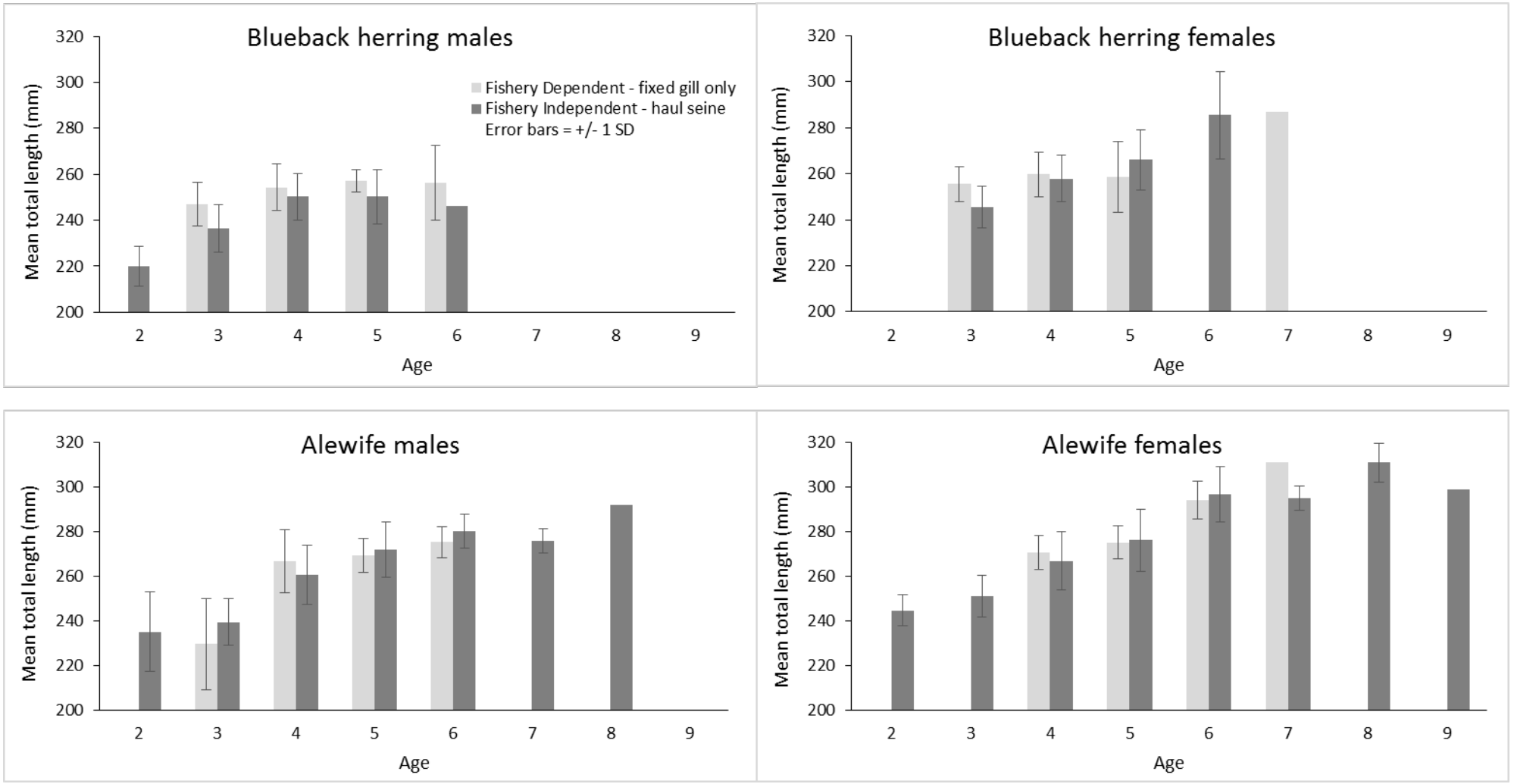


Figure 9. Comparison of length at age of river herring sampled in the lower-river fixed gill net commercial fishery versus the fishery independent survey in 2012.

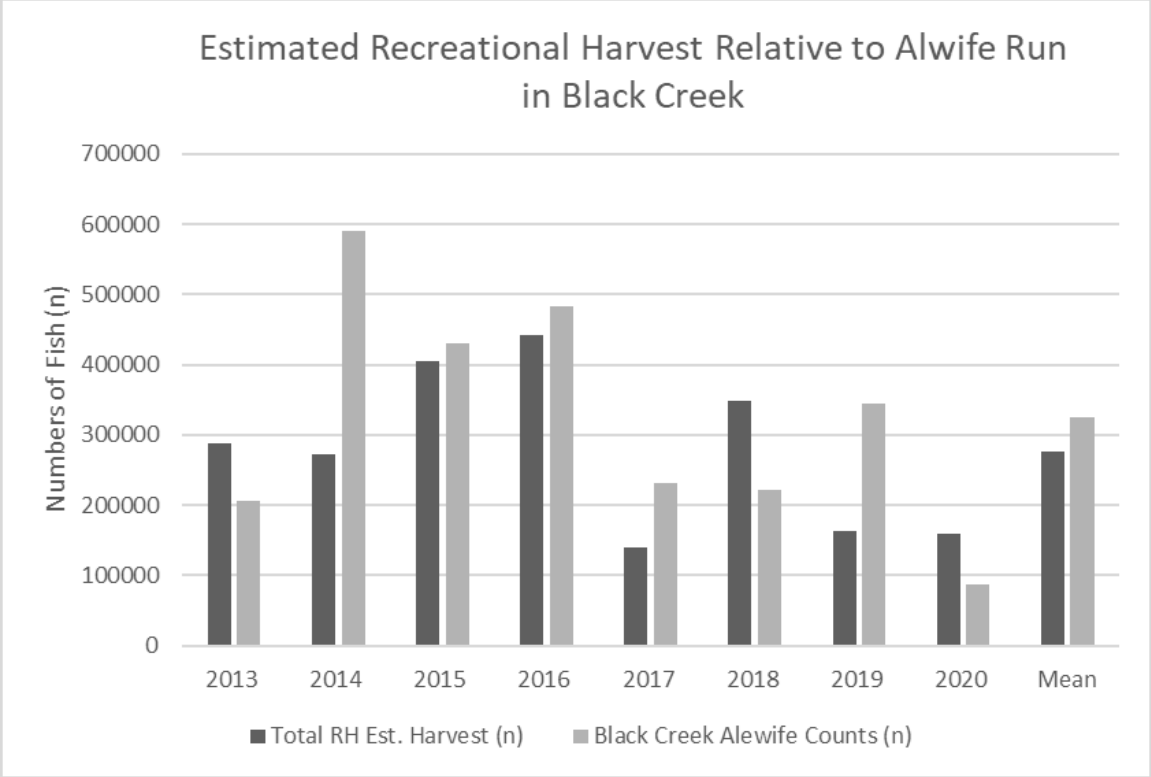


Figure 10. Estimated recreational river herring harvest relative to annual alewife counts in Black Creek, one of 68 tributaries to the Hudson River.

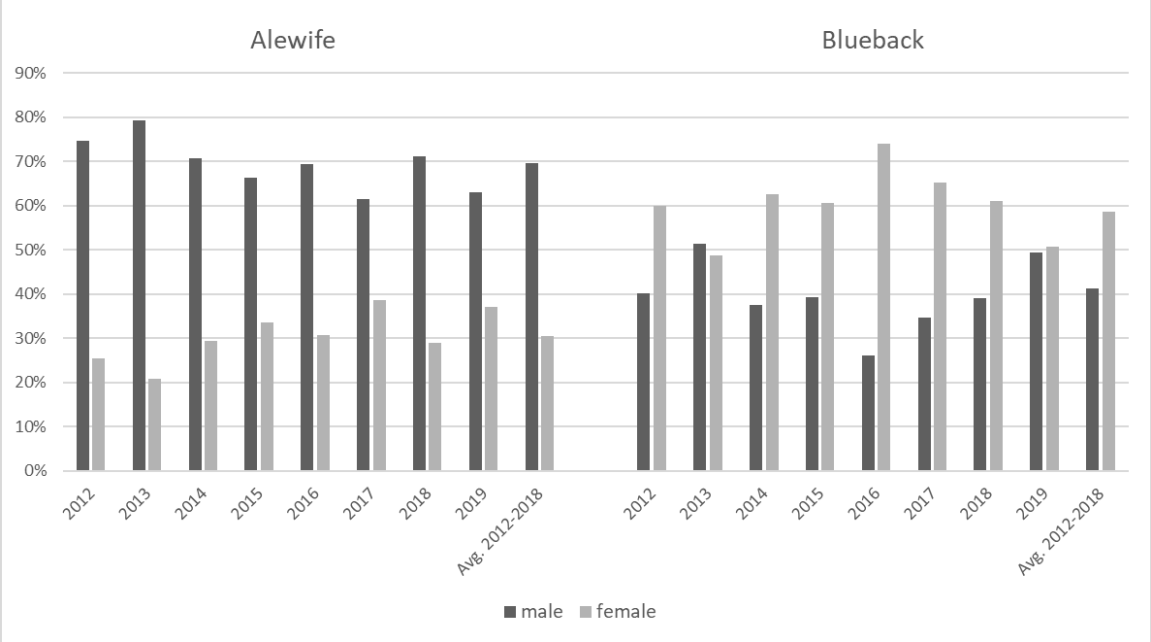


Figure 11. Annual sex ratios from river herring collected during the fisheries independent survey.

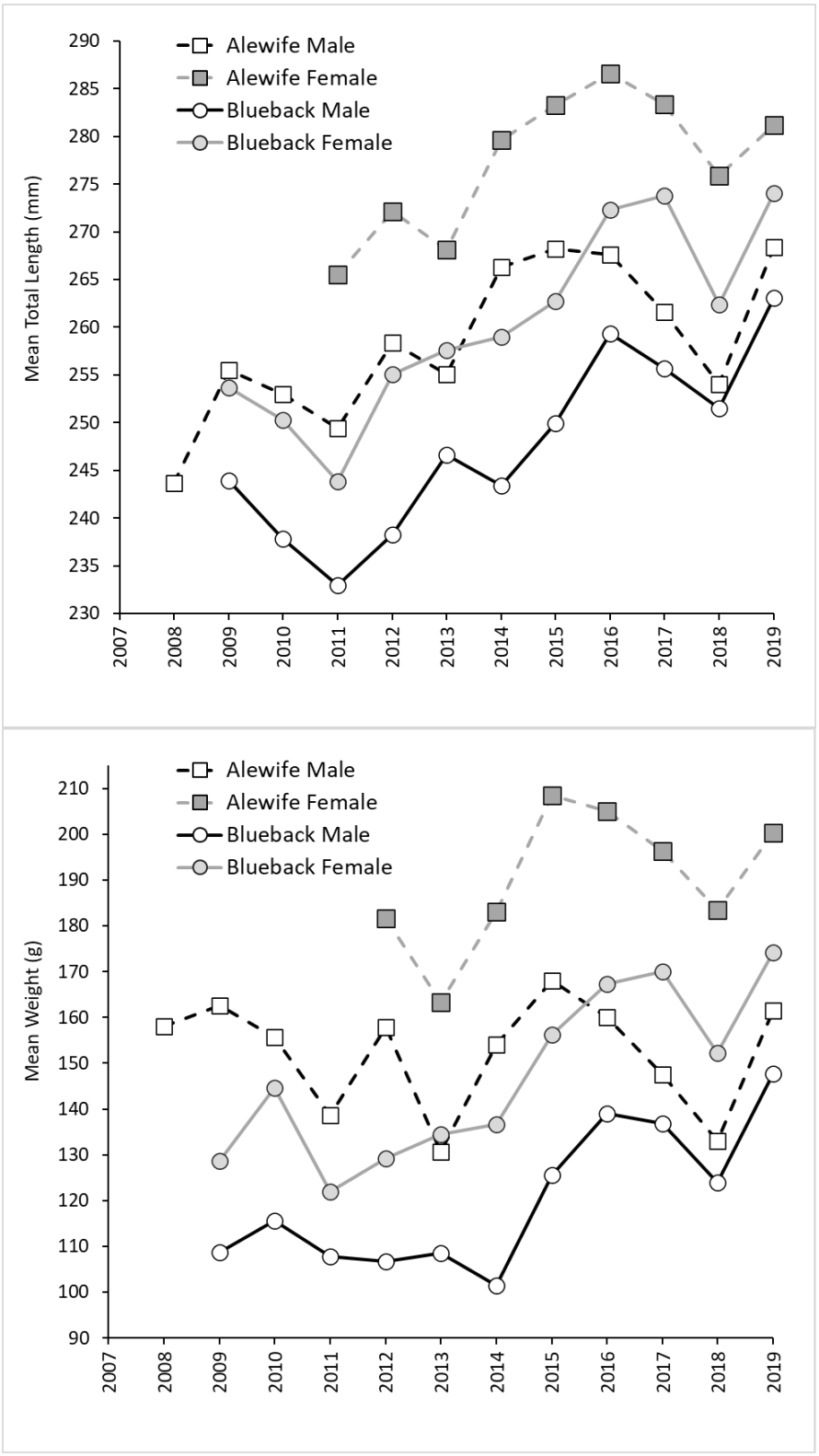


Figure 12. Mean length (top) and weight (bottom) of river herring collected during fishery independent sampling.

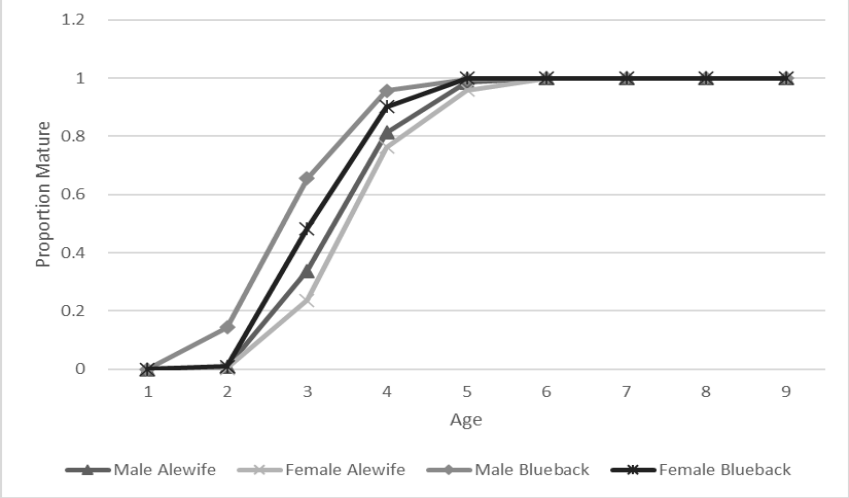


Figure 13. Maturity schedule for alewife and blueback herring derived from 2012-19 age and repeat spawn data.

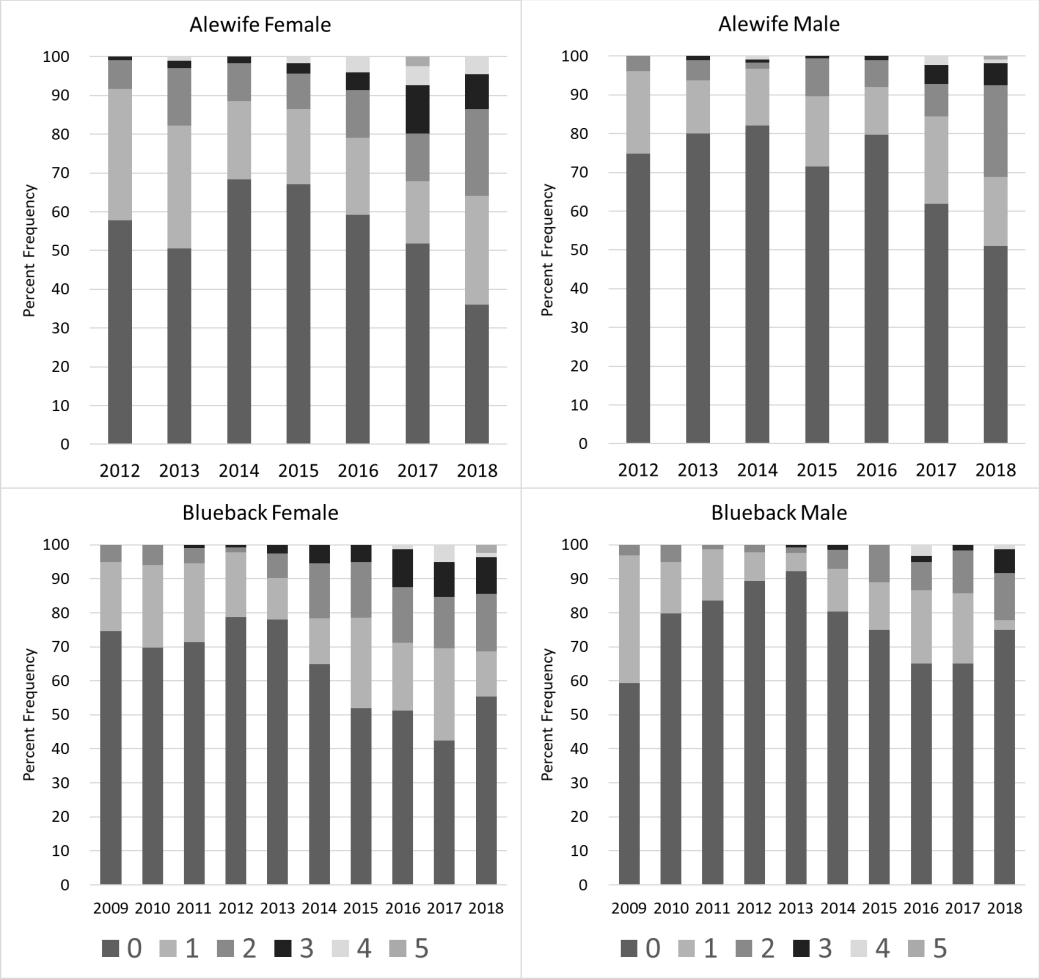


Figure 14. Frequency of repeat spawning occurrence of river herring collected during fisheries independent sampling. Numbers in legend indicate number of repeat spawns

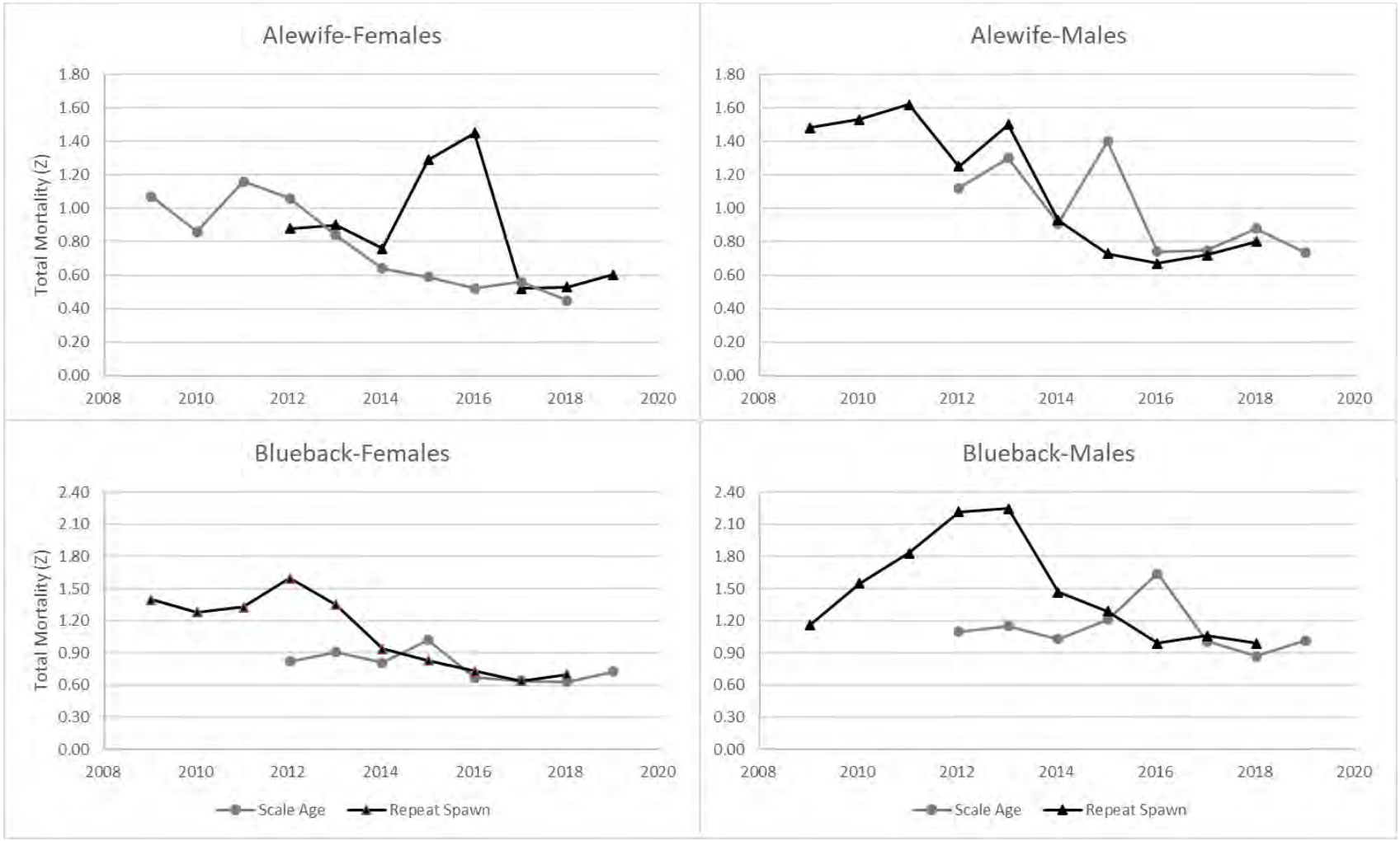


Figure 15. Annual total instantaneous mortality (Z) estimates for river herring collect during fisheries independent sampling.

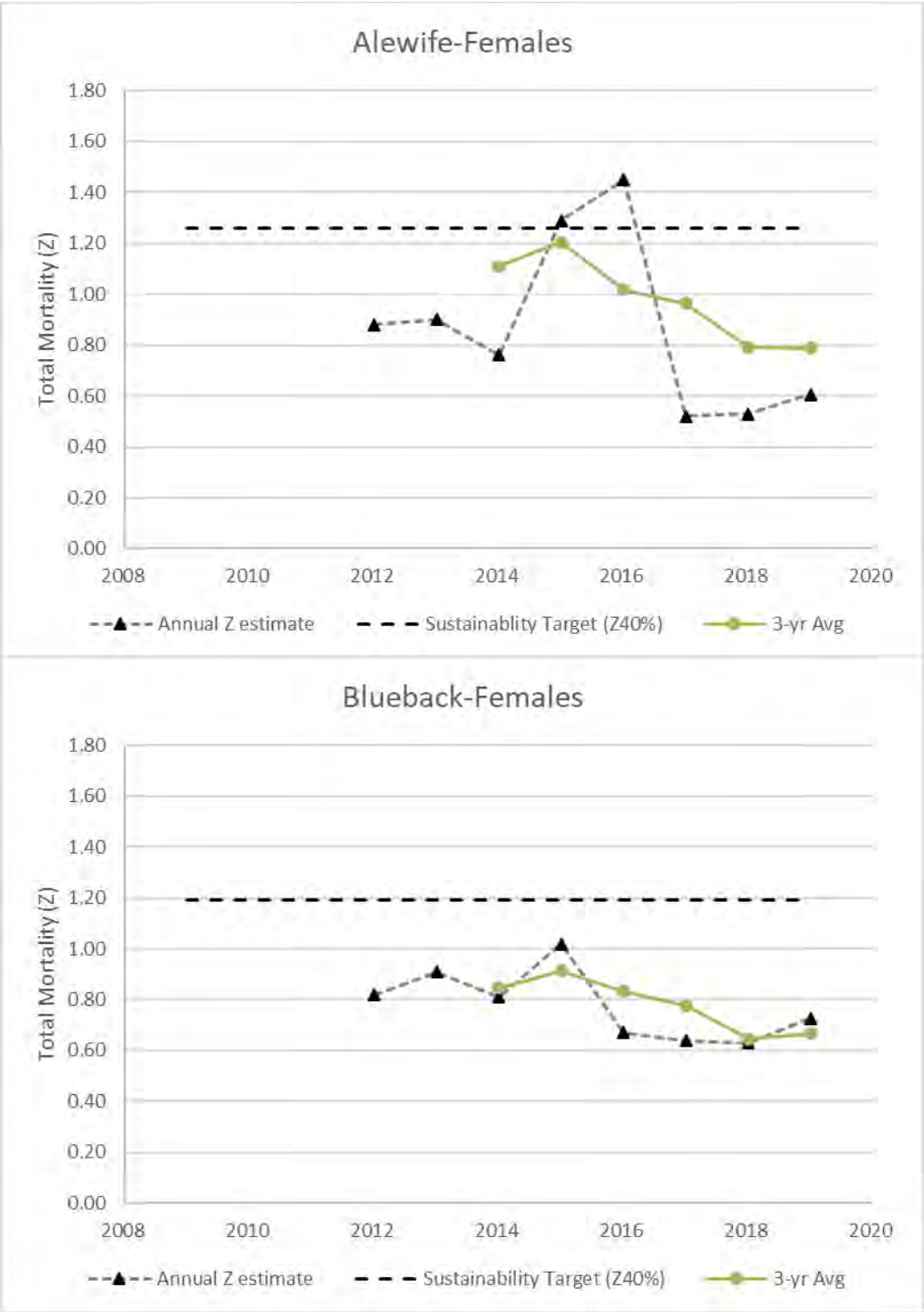


Figure 16. Chapman-Robson instantaneous total mortality (Z) estimates, three-year average Z estimates and respective $Z_{40\%}$ sustainability thresholds for alewife and blueback females.

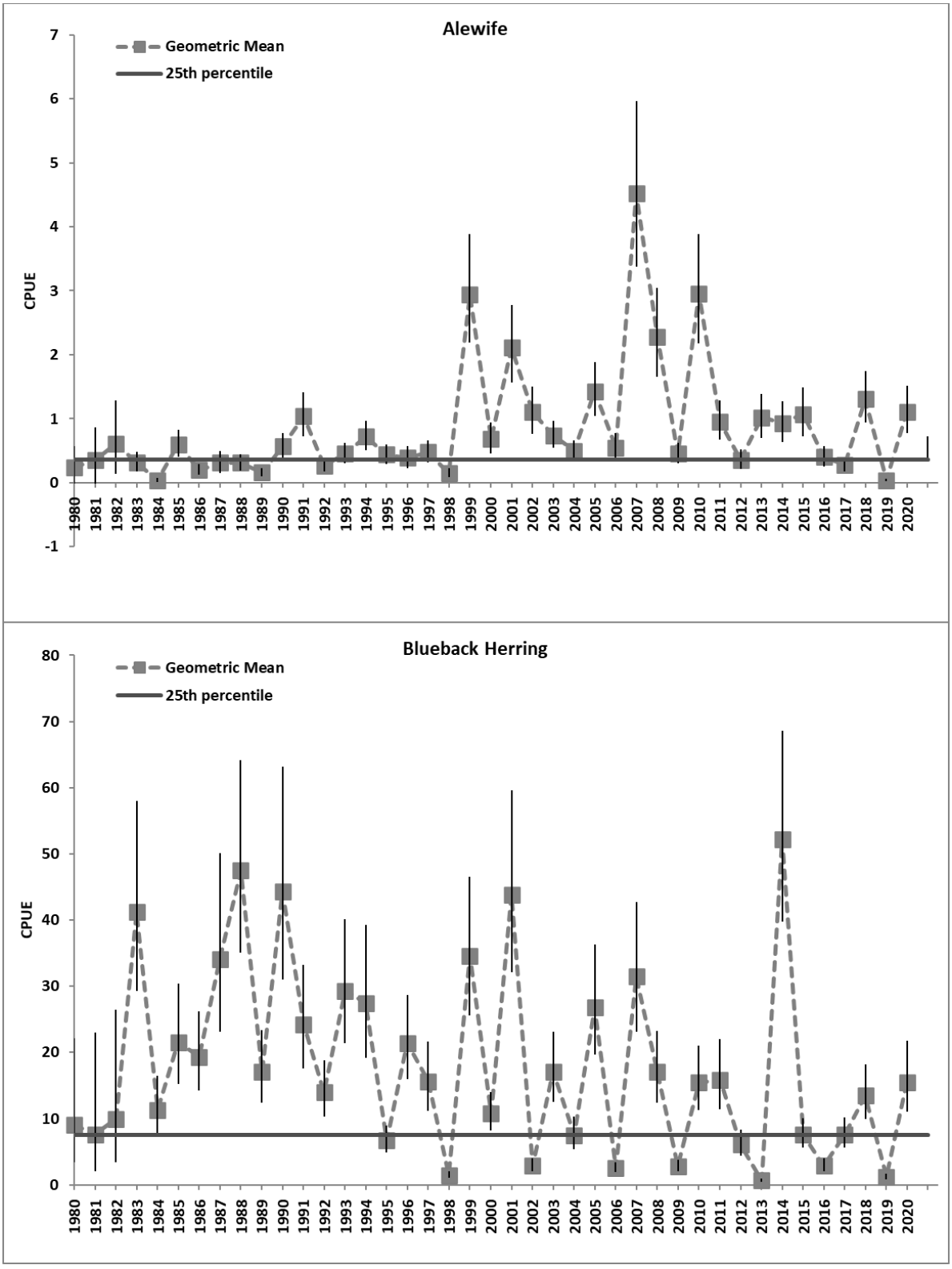


Figure 17. Young-of-year abundance indices for both river herring species.

Table 1. Summary of available fishery-dependent river herring data in Hudson River and Marine District of New York.

Data Type	Time period/ Details	Description	Usefulness as index
Fishery Dependent - Commercial			
Harvest	Historic data: -1904-1994: NMFS -1994-present: Hudson (see below)- NYSDEC; Marine waters- VTR/dealer report since 2002 -1994- present: transfer of historic NMFS data to ACCSP, data available in confidential and non-confidential form	- Provide catch and effort data - Not separated by area (river v marine) - River data reporting rate unknown	- Gives historic perspective - Provides trend data for state as a whole but does not separate river(s) from ocean until 1994.
Marine monitoring	River herring most likely occur as bycatch in variety of fisheries	No port sampling in NY for 'herring'	
Hudson River Mandatory reports	- Began in 1995 through the present - Enforcement of reports in 2000 - Catch and effort statistics	- Data from 2000 to present good - Reporting rate unknown - Data separated by gear used: - Fixed gill net below Bear Mountain Bridge (BMB); passive gear below spawning area; consistent manner of fishing; weekly sum of CPUE approximating "area under curve" method - In spawning area above BMB - Drift gill (main-stem HR only) - active gear - Fixed gill (main-stem HR only) - less effort than below BMB - Scap/lift net (main-stem HR only)	Emigration area CPUE - Fixed GN below BMB: o Good indicator of abundance o increasing trend Spawning area CPUE o Drift GN - variable o Scap - Flat
Hudson R. Fishery Monitoring	- Began in 1999 through the present - Onboard monitoring - Catch and effort statistics - Catch subsample	- Number of annual trips are low; co-occurs & staffing conflicts with FI sampling - Catch samples increased after 2012 - NEED improved sample size to be useful	- Characterize catch
Fishery Dependent - Recreational			
Harvest (primarily sought as bait for striped bass; some harvest for personal consumption)	Creel surveys: - 2001, river-wide, all year - 2005, spring only - 2007, state-wide angler survey; effort for striped bass	- 2001: provides point estimate of effort for striped bass, ancillary river herring (RH) data - 2005 provides point estimate of RH harvest & effort for striped bass	Combination of effort for striped bass and point estimate of RH harvest; combine with below CAP data to estimate magnitude of recreational harvest for 2005 to the present.
Cooperative Angler Program	Data 2006-present	Diary program for striped bass anglers; includes data for RH catch or purchase, use by trip	Good RH use per trip- used above with rec. harvest to estimate total recreational harvest

Table 2. Summary of available fishery-independent river herring data in Hudson River, New York.

Data type	Time period/Agency	Description	Usefulness as index
Fishery Independent- Hudson River			
Spawning stock	1936: Biological Survey	Historic data, low sample size of 25 fish, species, sex, length & age	Indication of size change to present
	2001 to present: NYSDEC spawning stock survey	Focused spawning stock survey: >300 fish collected most years; species, sex, length, scales & otoliths	Early sample design precluded use for catch-per-unit-effort data. Fixed site sampling since 2012 is geared toward an adult index. Mortality estimates from scales 2012-present and from spawn marks 2009-present Selected total mortality sustainability target $Z_{40\%}$
Young-of-year Indices	1983 to present: NYSDEC YOY survey	July-Oct sampling within nursery area Geometric mean number per haul Catchability may be affected by habitat change 2006 to present; documents presence/absence of river herring in Hudson tributaries and in some Long Island streams	Both species index variable Alewife increasing Blueback slight decreasing trend Selected conservative sustainability target of 25th percentile

Table 3. Recent records of type of commercial licenses sold for the New York portions of the Hudson River Estuary.

	Gill Nets				Scap Nets		Gill net		Scap Net	
Year	N-Fishers	Shad/herring Gill Net	Gill Net	Total GN permits sold	N-Fishers	Permits sold	N-Fishers reporting herring	% Reporting	N-Fishers reporting herring	% Reporting
1995	112	47	75	122	2	2	5	4%	2	100%
1996	134	54	88	142	2	2	4	3%	2	100%
1997	112	45	74	119	35	35	22	20%	24	69%
1998	140	65	119	184	46	46	33	24%	33	72%
1999	145	77	68	145	31	31	40	28%	20	65%
2000	223	108	123	231	443	449	67	30%	124	28%
2001	190	87	83	170	345	348	67	35%	127	37%
2002	232	141	120	261	291	338	87	38%	113	39%
2003	238	144	106	250	237	278	96	40%	115	49%
2004	275	160	127	287	245	291	89	32%	106	43%
2005	255	162	111	273	215	255	68	27%	80	37%
2006	290	179	129	308	229	273	92	32%	87	38%
2007	290	178	130	308	201	244	87	30%	75	37%
2008	277	173	119	292	182	219	78	28%	85	47%
2009	254	159	108	267	168	199	76	30%	78	46%
2010	181	0	185	185	161	190	74	41%	73	45%
2011	177	0	181	181	144	164	62	35%	61	42%
2012	154	0	155	155	128	151	66	43%	51	40%
2013	157	0	166	166	112	127	77	49%	33	29%
2014	150	0	152	152	109	124	47	31%	27	25%
2015	148	0	150	150	96	112	58	39%	33	34%
2016	143	0	145	145	92	104	59	41%	25	27%
2017	151	0	153	153	84	87	53	35%	22	26%
2018	137	0	139	139	78	81	50	36%	23	29%
2019	130	0	131	131	66	70	37	28%	14	21%
2020	111	0	111	111	55	58	40	36%	14	25%

Table 4. Number of river herring monitoring trips and catch per unit effort (CPUE) in the Hudson River commercial gill net fishery from 1996 through 2015. Only Trips where effort was calculated. Confidential data are in red.

YEAR	Fixed gill nets below Bear Mtn Bridge					Drift gill nets			
	Trips	Effort^	Catch	Annual CPUE	Sum of Weekly CPUE	Trips	Effort^	Catch	Annual CPUE
1996	0					1	91	43	0.472
1997	5	6830.6	208	0.030	0.055	0			
1998	0					0			
1999	4	11372.2	421	0.037	0.065	0			
2000	5	15650.0	545	0.035	0.126	1	160	7	0.044
2001	7	26688.9	1221	0.046	0.276	0			
2002	8	32222.2	1328	0.041	0.230	0			
2003	2	4800.0	171	0.036	0.071	0			
2004	11	41164.4	1826	0.044	0.230	0			
2005	1	9600.0	428	0.045	0.045	0			
2006	2	5591.1	246	0.044	0.044	1	378	0	0.000
2007	4	25777.8	299	0.012	0.055	2	4767	36	0.008
2008	0					0			
2009	3	19266.7	468	0.024	0.045	0			
2010	1	4326.7	154	0.036	0.036	0			
2011	4	6531.6	329	0.050	0.150	0			
2012	20	50916.4	1066	0.021	0.154	6	7013	560	0.080
2013	4	10719.8	1382	0.129	0.419	1	178	112	0.630
2014	7	14612.8	2161	0.148	0.605	1	2843	289	0.102
2015	5	8435.0	605	0.072	0.176	1	637	197	0.309
2016	10	22435.1	842	0.038	0.265	5	1021	152	0.149
2017	13	19991.7	1395	0.070	0.313	10	4820	819	0.170
2018	20	40819.3	2839	0.070	0.272	7	8043	290	0.036
2019	13	18477.8	2839	0.072	0.311	0			
2020	No Sampling-Covid-19								

^Sq yd net area * hours

Table 5. Observed landings and dockside subsamples for commercial river herring trips made in the Hudson River Estuary for 2001 through 2015. Only trips where effort was calculated is presented. Confidential data in red.

On-board Observations of Commercial Trips																				
		Alewife					Blueback herring					Unidentified "river herring"								
	N of	Number			Sex ratio		Number			Sex ratio		Number			Sex ratio			Percent		
Year	trips	M	F	U	M	F	M	F	U	M	F	M	F	U	M	F	Total	Alewife	Blueback	Unknown
2001	7	192	178	851	0.52	0.48											1,221	100%	0%	0%
2002	8			43			19	41	1225	0.32	0.68						1,328	3%	97%	0%
2003	2			171													171	100%	0%	0%
2004	11	124	168	8	0.42	0.58	5	6		0.45	0.55	500	796	297	0.39	0.61	1,904	16%	1%	84%
2005	1			428										28			456	94%	0%	6%
2006	3			1					246								247	0%	100%	0%
2007	6			14					53					268			335	4%	16%	80%
2008	0											44					44	0%	0%	100%
2009	3	187	179	4	0.51	0.49	37	61		0.38	0.62						468	79%	21%	0%
2010	1	23	28	1	0.45	0.55	11	88	3	0.11	0.89						154	34%	66%	0%
2011	4	163	148	0	0.52	0.48	3	5		0.38	0.63			10			329	95%	2%	3%
2012	26	439	568	121	0.44	0.56	54	70	68	0.44	0.56			383			1,703	66%	11%	22%
2013	5	615	586	1	0.51	0.49	98	305		0.24	0.76						1,605	75%	25%	0%
2014	8	750	830	5	0.47	0.53	236	629		0.27	0.73						2,450	65%	35%	0%
2015	6	202	291	12	0.41	0.59	77	185		0.29	0.71			35			802	63%	33%	4%
2016	15	182	257	1	0.41	0.59	224	315	15	0.42	0.58						994	44%	56%	0%
2017	23	401	735	13	0.35	0.65	412	622	25	0.40	0.60						2,208	52%	48%	0%
2018	27	513	920	158	0.36	0.64	541	900	55	0.38	0.62		1	41			3,129	51%	48%	1%
2019	13	243	439	2	0.36	0.64	180	463	1	0.28	0.72						1,328	52%	48%	0%
2020	0	No Sampling-Covid-19																		

Table 6. Age structure of river herring samples from the commercial fishery. 2012 commercial scale samples were aged; 2013-2015 ages were estimated using age-length keys derived from fishery independent samples.

	Age										
	2	3	4	5	6	7	8	9	10	Total	Mean Age
Alewife Male											
2012	4	71	110	37	4	5				231	3.91
2013*		26	37	15	3	1				83	3.97
2014*		32	82	102	2	1	1			221	4.37
2015*		4	42	53	18	1	1			118	4.77
2016*		12	47	22	26					107	4.58
2017*		15	30	16	12	7	4			85	4.74
2018*		10	19	30	9	5				73	4.73
2019**		1	14	17	14	4	1	0		51	5.17
2020***											
Alewife Female											
2012	1	30	155	121	25	11	2	1		346	4.54
2013*		19	39	12	5	1				76	4.07
2014*		23	106	62	18	11	3	2		225	4.57
2015*		14	41	67	18	4	1			146	4.73
2016*		6	52	33	53	14	2			160	5.14
2017*		13	32	24	13	11	11	1		104	5.13
2018*		3	22	36	13	17	18	4	1	114	5.81
2019**		1	14	21	14	9	3	1	0	62	5.46
2020***											
Blueback Male											
2012	2	18	40	11	3					75	3.94
2013*		10	9	4	2					25	3.92
2014*		17	55	25	2					99	4.12
2015*		7	8	17	1					33	4.35
2016*		4	67	13	11					95	4.32
2017*		4	12	32	10					57	4.84
2018*		10	15	7	8	4				44	4.57
2019**		1	7	5	2	1	0			16	4.78
2020***											
Blueback Female											
2012		32	68	34	2	2				137	4.09
2013*		13	11	6	2	1				32	3.92
2014*		26	63	23	13	5				130	4.29
2015*		6	16	16	4	1				43	4.53
2016*		6	67	39	19	4				135	4.61
2017*			11	11	27	20	4			73	5.93
2018*		10	15	7	8	4				44	4.57
2019**		1	8	9	8	1	0	0		28	5.11
2020***											

* 2013-2018 ages are estimated using the length at age key derived from the fishery independent data from that respective year

** 2019 ages estimated using length at age key derived from fishery independent data from 2016-2019

*** No sampling due to Covid 19

Table 7. Estimated recreational use and take of river herring by Hudson River anglers.

	Herring Use*							
Year	% of all CAP Trips using herring as bait	N bought / trip	N caught / trip	Total RH use/trip	% change in annual CAP SB trips	Estimated Statewide SB trips**	SB trips using herring as bait**	Est. Rec Herring Use (n)
2001						53,988	39,500	93,157**
2005	0.89			2.36		72,568	64,500	152,117**
	Cooperative Angler Program Data							
2006	0.49	1.47	2.57	4.04				
2007	0.27	1.64	1.78	3.42		90,742	24,920	85,249***
2008	0.33	0.81	1.54	2.35	41%	128,393	42,526	99,947***
2009	0.35	0.61	3.68	4.29	7%	97,251	33,884	145,410***
2010	0.52	0.67	4.76	5.42	5%	95,029	49,658	269,385***
2011	0.48	0.71	4.35	5.06	66%	150,952	71,808	363,101***
2012	0.53	1.10	4.76	5.86	-15%	76,797	40,398	236,671***
2013	0.58	1.04	5.23	6.27	-18%	74,023	43,129	270,566***
2014	0.56	0.74	5.30	6.04	-16%	76,039	42,326	255,694***
2015	0.58	0.66	6.04	6.70	12%	101,199	58,486	391,784***
2016	0.54	0.40	4.44	4.84	80%	163,685	88,040	426,098***
2017	0.48	0.43	3.57	4.00	-30%	63,519	30,482	122,055***
2018	0.58	0.62	3.81	4.43	43%	129,506	75,639	335,341***
2019	0.49	0.44	3.20	3.64	-6%	85,627	42,328	153,969***
2020	0.43	0.72	2.59	3.31	-14%	77,752	33,455	110,738***

*Data from NYSDEC - HRFU Cooperative Angler Program (unpublished data)

**Creel survey data: NAI 2003, NAI 2007; 2001 estimated use modified using 2005 RH use per trip* 2001 trips using herring as bait; From 2008 to 2020 estimated using the percent change in annual effort of the CAP data*2007 SB trips from NYSDEC statewide angler survey

***Estimate calculated from the average RH/trip (CAP) and Estimated SB trips from 2007 NYSDEC statewide angler survey adjusted annually using the percent change in effort from CAP data

Table 8. Annual daily alewife count data from Black Creek and commercial and estimated recreational river herring harvest.

	Total Counts	Min	Max	Mean	LCI	UCI	n (days)*	Commerical Harvest**	Recreational Harvest***	Total RH Est. Harvest (n)
2013	205,885	25	40,571	4,381	203,681	208,089	47	17,547	270,567	288,113
2014	590,680	294	58,416	18,459	586,104	595,256	32	16,574	255,695	272,269
2015	431,136	26	45,186	13,065	426,992	435,280	33	13,226	391,785	405,010
2016	483,555	2	91,715	8,955	479,133	487,977	54	16,270	426,098	442,368
2017	231,930	12	28,692	7,482	229,576	234,284	31	18,309	122,056	140,365
2018	221,951	20	36,281	5,285	219,223	224,679	44	12,440	335,342	347,781
2019	344,682	14	33,048	5,559	342,765	346,599	58	8,844	153,970	162,814
2020	87,764	0	15,546	1,721	86,764	88,765	51	6,077	153,971	160,048

* Number of days count data were recorded

**Number harvested of combined river herrring species from Hudson River commercial reports

***Estimated harvest numbers of combined river herring species derived from CAP data and 2007 statewide angler survey

Table 9. Annual catch and effort (n-hauls) for alewife and blueback herring.

Year	Annual Catch (Alewife)	Annual Catch (Blueback)	Annual Effort (N-hauls)	Annual CPUE (Alewife)	Annual CPUE (Blueback)
	Historical survey data				
2001	1336	28	8	167.00	3.50
2003	417	7	16	26.06	0.44
2004	0	10	2	0.00	5.00
2005	120	41	13	9.23	3.15
2006	27	3	5	5.40	0.60
2007	53	0	6	8.83	0.00
2008	262	21	15	17.47	1.40
2009	660	182	20	33.00	9.10
2010	265	44	56	4.73	0.79
2011	74	80	21	3.52	3.81
	Current survey data				
2012	2149	1304	165	13.02	7.90
2013	4865	4057	120	40.54	33.81
2014	11240	3054	115	97.74	26.56
2015	4328	3030	104	41.62	29.13
2016	4126	1967	152	27.14	12.94
2017	2480	416	95	26.11	4.38
2018	3783	1449	133	28.44	10.89
2019	8368	2307	121	69.16	19.07
2020	No sampling Covid-19				

Table 10. Von Bertalanffy model parameters (Linf, K, t0) and outputs for river herring in the Hudson River.

	Female Alewife	Male Alewife	Female Blueback	Male Blueback
n fish	1172	1197	933	860
Linf	311.4065	292.5934	292.3044	269.466
K	0.4791	0.5333	0.5936	0.7652
t0	-0.1716	-0.1498	-0.1294	-0.06576
Age	Predicted Total Length			
0	-53.0	-18.3	26.7	13.2
1	-53.0	133.4	127.7	150.3
2	-53.0	205.0	189.2	214
3	-53.0	238.9	226.5	243.7
4	-53.0	254.9	249.3	257.5
5	-53.0	262.4	263.1	263.9
6	-53.0	266.0	271.5	266.9
7	-53.0	267.7	276.7	268.3
8	-53.0	268.5	279.8	268.9
9	-53.0	268.9	281.7	269.2
10	-53.0	269.0	282.8	269.3

Table 11. Age structure of river herring from fisheries independent sampling.

Age											
Year	2	3	4	5	6	7	8	9	10	Total	Mean Age
Alewife Male											
2012	27	385	726	308	91	21	2			1559	4.1
2013		615	782	276	48	15	1			1737	3.9
2014	1	372	933	1233	61	18	29			2647	4.4
2015		105	430	544	203	12	8			1302	4.7
2016	3	192	670	354	462	34				1715	4.7
2017		343	365	168	119	53	18			1067	4.3
2018		406	554	456	104	40	7	2		1569	4.3
2019*		139	757	583	397	80	17			1974	4.8
2020**											
Alewife Female											
2012	5	76	210	175	32	11	7	2		518	4.4
2013		148	275	84	58	17	12	1		596	4.3
2014		83	537	383	137	75	27	5		1247	4.7
2015		56	179	372	114	30	8			759	4.9
2016		34	254	165	375	110	21	1		960	5.4
2017		61	183	151	101	99	44	7		647	5.2
2018		76	303	194	70	99	94	18	3	857	5.2
2019*		44	447	407	216	132	56	11	2	1314	5.1
2020**											
Blueback Male											
2012	64	157	89	16	3					329	3.2
2013	34	483	209	44	17					787	3.4
2014	83	308	205	51	1					649	3.4
2015	3	412	168	44	3					630	3.4
2016	2	75	302	25	30					434	4.0
2017	18	41	18	34	5					116	3.7
2018	2	236	161	20	25	12				456	3.7
2019*	1	84	177	72	35	7				374	4.2
2020**											
BluebackFemale											
2012		152	168	61	4					385	3.8
2013	1	364	203	97	21	1				687	3.7
2014	7	320	274	77	36	9				723	3.8
2015		248	262	162	36	9				716	4.0
2016		19	287	222	207	36	14			786	5.0
2017		68	29	95	47	12	1			252	4.6
2018		208	157	51	71	13	5	5		510	4.1
2019*		78	179	132	91	18	5	2		505	4.6
2020**											

* Numbers at age estimated using 2016-2018 age-length key
** No Sampling Covid-19

Table 12. Repeat spawn data of river herring from fisheries independent sampling.

Year	Repeat spawning marks							Total	Mean RS	% Virgin	% Repeat
	0	1	2	3	4	5	6				
Alewife Male											
2009	229	65	12	0				306	0.29	0.75	0.25
2010	165	28	11	2				206	0.27	0.80	0.20
2011	101	18	2	1	1			123	0.24	0.82	0.18
2012	138	35	19	1				193	0.39	0.72	0.28
2013	150	23	13	2				188	0.29	0.80	0.20
2014	52	19	7	4	2			84	0.63	0.62	0.38
2015	54	19	25	6	1	1		106	0.91	0.51	0.49
2016	51	19	30	12				112	1.03	0.46	0.54
2017	58	11	16	13	3			101	0.93	0.57	0.43
2018	64	13	4	11	6			98	0.80	0.65	0.35
2019*											
2020**											
Alewife Female											
2009	70	41	9	1				121	0.51	0.58	0.42
2010	51	32	15	2	1			101	0.71	0.50	0.50
2011	84	25	12	2				123	0.45	0.68	0.32
2012	124	36	17	5	3			185	0.52	0.67	0.33
2013	116	39	24	9	8			196	0.74	0.59	0.41
2014	42	13	10	10	4	2		81	1.10	0.52	0.48
2015	32	25	20	8	4			89	1.18	0.36	0.64
2016	40	20	18	24	5	2		109	1.45	0.37	0.63
2017	53	14	16	17	13			113	1.32	0.47	0.53
2018	41	10	6	16	14	8		95	1.75	0.43	0.57
2019*											
2020**											
Blueback Male											
2009	38	24	2					64	0.44	0.59	0.41
2010	63	12	4					79	0.25	0.80	0.20
2011	66	12	1					79	0.18	0.84	0.16
2012	294	28	7					329	0.13	0.89	0.11
2013	118	7	2	1				128	0.11	0.92	0.08
2014	57	9	4	1				71	0.28	0.80	0.20
2015	48	9	7					64	0.36	0.75	0.25
2016	39	13	5	1	2			60	0.57	0.65	0.35
2017	41	13	8	1				63	0.51	0.65	0.35
2018	54	2	10	5	1			72	0.57	0.75	0.25
2019*											
2020**											
Blueback Female											
2009	44	12	3					59	0.31	0.75	0.25
2010	46	16	4					66	0.36	0.70	0.30
2011	80	26	5	1				112	0.35	0.71	0.29
2012	107	26	2	1				136	0.24	0.79	0.21
2013	121	19	11	4				155	0.34	0.78	0.22
2014	48	10	12	4				74	0.62	0.65	0.35
2015	41	21	13	4				79	0.75	0.52	0.48
2016	41	16	13	9	1			80	0.91	0.51	0.49
2017	25	16	9	6	3			59	1.08	0.42	0.58
2018	46	11	14	9	1	2		83	0.96	0.55	0.45
2019*											
2020**											

** No sampling Covid-19

*** Repeat spawn data unavailable

Table 13. Instantaneous mortality estimates derived from age and repeat spawn data using a bias-correction Chapman and Robson mortality estimator described in Smith et al. (2012).

	Scale Age												Repeat Spawn											
	Alewife						Blueback						Alewife						Blueback					
	Female			Male			Female			Male			Female			Male			Female			Male		
Year	Z	SE	3-yr Avg	Z	SE	3-yr Avg	Z	SE	3-yr Avg	Z	SE	3-yr Avg	Z	SE	3-yr Avg	Z	SE	3-yr Avg	Z	SE	3-yr Avg	Z	SE	3-yr Avg
2009													1.07	0.22		1.48	0.12		1.40	0.09		1.16	0.41	
2010													0.86	0.01		1.53	0.12		1.28	0.13		1.55	0.12	
2011													1.16	0.09	1.03	1.62	0.21	1.54	1.33	0.10	1.34	1.83	0.13	1.51
2012	0.88	0.19		1.12	0.09		0.82	0.35		1.10	0.22		1.06	0.06	1.03	1.25	0.15	1.47	1.60	0.14	1.40	2.22	0.11	1.87
2013	0.90	0.08		1.30	0.10		0.91	0.13		1.15	0.12		0.84	0.08	1.02	1.50	0.19	1.46	1.35	0.19	1.43	2.25	0.44	2.10
2014	0.76	0.13	0.85	0.91	0.45	1.11	0.81	0.18	0.85	1.03	0.26	1.09	0.64	0.08	0.85	0.93	0.05	1.23	0.94	0.18	1.30	1.47	0.15	1.98
2015	1.29	0.04	0.98	1.40	0.22	1.20	1.02	0.20	0.91	1.21	0.15	1.13	0.59	0.17	0.69	0.73	0.13	1.05	0.83	0.12	1.04	1.29	0.28	1.67
2016	1.45	0.12	1.17	0.74	0.29	1.02	0.67	0.20	0.83	1.64	0.49	1.29	0.52	0.13	0.58	0.67	0.20	0.78	0.73	0.11	0.83	0.99	0.12	1.25
2017	0.52	0.09	1.09	0.75	0.07	0.96	0.64	0.08	0.78	1.01	0.12	1.29	0.56	0.14	0.56	0.72	0.16	0.71	0.64	0.06	0.73	1.06	0.13	1.11
2018	0.53	0.09	0.83	0.88	0.15	0.79	0.63	0.09	0.65	0.87	0.14	1.17	0.45	0.12	0.51	0.80	0.21	0.73	0.70	0.12	0.69	0.99	0.28	1.01
2019	0.61	0.07	0.55	0.74	0.02	0.79	0.73	0.11	0.67	1.02	0.10	0.97	No estimates											

Table 14. Life history data used as inputs to the Thompson-Bell spawning stock biomass per-recruit models.

	M		Maturity		Weight at age	
Age	Alewife	Blueback	Alewife	Blueback	Alewife	Blueback
1	0.59	0.59	0.00	0.00	21.45	22.24
2	0.59	0.59	0.00	0.01	70.03	72.32
3	0.59	0.59	0.24	0.48	122.71	120.96
4	0.59	0.59	0.76	0.90	166.54	156.46
5	0.59	0.59	0.96	1.00	198.75	179.32
6	0.59	0.59	1.00	1.00	220.91	193.14
7	0.59	0.59	1.00	1.00	235.60	201.23
8	0.59	0.59	1.00	1.00	245.12	205.89
9	0.59	0.59	1.00	1.00	251.21	208.54
10	0.59	0.59	1.00	1.00	255.07	210.04

Table 15. Results of biological reference point, Z40% from Thompson-Bell spawning stock biomass per-recruit models.

	M	$Z_{40\%}$
Female Alewife	0.59	1.26
Female Blueback	0.59	1.16

8 Appendix 1

Table A. Summary of historical and current commercial fishery regulations for alewife and blueback herring in New York State (2013 regulation changes in bold).

Regulation	2013 to Present	Regulation link
Season	Mar 15 – Jun 15	6 CRR-NY 36.3 (a)
Creel/ catch limits	None	
Commercial Gear (Marine permit)	Gill nets as commercial gear - 600 ft or less - 3.5 in stretch mesh or smaller - No fishing at night in HR above Bear Mt Bridge - **Drift gill nets only allowable gill nets above Bear Mt Bridge** - Gill nets above Bear Mt Bridge must be tended at all times	6 CRR-NY 36.3 (c) 6 CRR-NY 36.3 (b) 6 CRR-NY 36.3 (3)(i) 6 CRR-NY 36.3 (7) 6 CRR-NY 36.3 (2)(iv) 6 CRR-NY 36.3 (5)
	Seine as commercial gear - No size restrictions below Castleton/I90	6 CRR-NY 36.3 (c)
	Scoop/Dip/Scap net as commercial gear - **10' x 10' maximum**	6 CRR-NY 36.3 (c)
	Fyke/hoop/trap nets as commercial gear - No size restrictions	6 CRR-NY 36.3 (c)
Commercial Gear (Bait license)	Cast Net as bait collection gear - 10 ft maximum diameter	*To find the law* **click here**, *on ENV, find Article 11, click on Title 13, click* ***ECL 11-1315***
Closed areas	No gill nets above I90 - Castleton Bridge	6 CRR-NY 36.3 (2)(ii)
	No nets on Kingston Flats	6 CRR-NY 36.3 (2)(i)
	No nets in any tributary (including Mohawk River)	6 CRR-NY 36.3 (2)(i)
Escapement (no fishing days)	36 hr lift period for **all commercial gears** Friday 6AM – Saturday 6PM	6 CRR-NY 36.3 (4)
Marine Permit Fees (established 1911)	Gill net $0.05/foot	6 CRR-NY 35.1
	Scap net <10 sq ft $1.00	
	Seine $0.05/foot	
	Trap nets $3 to $10	
	Fyke net $1 to $2	
Marine Permit Reporting	**Mandatory daily catch & effort; Vessel Trip Reports (VTRs) due monthly**	6 CRR-NY 36.1 (a)(1)
Transport and sale	- Commercially caught anadromous river herring must be sold and used in the Hudson River and tributaries to first impassable barrier and within the transport corridor - May also be sold or transferred to locations in the Marine District - Transport within DEC Reg. 3 requires a bait transport permit - Retail sale of live and frozen anadromous river herring requires o Fish health certification on premises o Receipt to purchaser (valid for 10 days) - Retail sale of dead packaged anadromous river herring requires o Preservation other than freezing o Each package must be labeled with ▪ Name of packager-processor ▪ Name of fish species ▪ Quantity of fish ▪ Means of preservation	6 CRR-NY 35.3 (d) 6 CRR-NY 35.3 (c)(1) 6 CRR-NY 35.3 (c)(2) 6 CRR-NY 35.3 (c)(3)(ii) 6 CRR-NY 35.3 (c)(3)(iii)(a) 6 CRR-NY 35.3 (c)(4)

Table B. Summary of historical and current recreational fishery regulations for alewife and blueback herring in New York State (2013 regulation changes in bold).

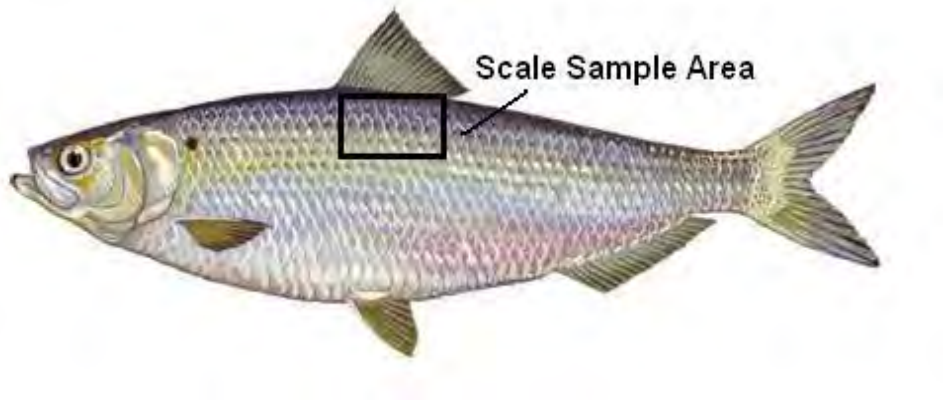
Regulation	**2013 to Present**	**Regulation link**
Season	Mar 15 – Jun 15	6 CRR-NY 10.10 (c)(2)
Creel/ catch limits (personal use)	**10 per day per angler or a maximum boat limit of 50 per day for a group of boat anglers (whichever is lower)**	6 CRR-NY 10.10 (c)(2)
Creel/ catch limits (party or charter)	- **10 per day per angler or a maximum boat limit of 50 per day for a group of boat anglers (whichever is lower)** - **Operator of party or charter north of Tappan Zee bridge may possess anadromous river herring in excess of individual recreational possession limit as long as** o **Register with Hudson River Fisheries Unit** o **Must display a valid Hudson River herring decal on port side of vessel**	6 CRR-NY 10.10 (c)(4)(i) 6 CRR-NY 10.10 (c)(4)(ii) 6 CRR-NY 10.10 (c)(4)(iii) 6 CRR-NY 10.10 (c)(4)(iii)(c)
Recreational gear (personal use)	Angling	6 CRR-NY 10.10 (c)(2)
	Seine – not exceeding 36 square feet	6 CRR-NY 10.10 (c)(3)(ii)(e)
	Scap net – - **Not exceeding 16 square feet** - Only one net	6 CRR-NY 10.10 (c)(3)(ii)(d) 6 CRR-NY 10.10 (c)(3)(ii)(b)
	Dip/Scoop – - Not exceeding 14 inches in diameter or 13 inches by 13 inches square - Only one net	6 CRR-NY 10.10 (c)(3)(ii)(c) 6 CRR-NY 10.10 (c)(3)(ii)(b)
	Cast net – not exceeding 10 feet in diameter	6 CRR-NY 10.10 (c)(3)(ii)(f)
Closed areas	- **No nets in any Hudson River tributary (including Mohawk R)** o **Nets must be stowed prior to entering a tributary** - **All other waters of NY State closed to the take of anadromous river herring**	6 CRR-NY 10.10 (c)(3)(i) 6 CRR-NY 10.10 (c)(3)(iii) 6 CRR-NY 10.10 (c)(2)
Transport restrictions	Herring taken in the Hudson River and tributaries (up to first impassable barrier) for personal use: - May only be used in the Hudson River and tributaries up to first impassable barrier - May only transported overland within the transportation corridor	6 CRR-NY 10.1 (f)(3)(iii) 6 CRR-NY 10.1 (f)(3)(iii)(c)
Escapement (no fishing days)	None	
License	Marine Registry	6 CRR-NY 10.10 (c)(1)(i)
Reporting	None	

9 Appendix 2

River Herring (Blueback *Alosa aestivalis*, Alewife *Alosa psuedoharengus*) **Aging Protocol**
New York Department of Environmental Conservation adopted from the Massachusetts Division of Marine Fisheries

Sample Collection

- Each fish is given its own sample ID (river, year, and fish number).
- Length, weight, sex, species, capture date and sample ID number are recorded on envelopes and data sheet.
- Fork length and total length are recorded on data sheet for every sample.
- Otoliths are extracted, wiped clean, and placed in a microcentrifuge tube with corresponding sample ID number.
- Otoliths are extracted using a scalpel and forceps. Slice off the top part of the head exposing the brain cavity. Slice should be shallow starting at the back of the skull slicing forward.
- Scoop out any brain matter.
- Using forceps extract the otic membrane (otoliths should be in the otic membrane).
- Scales collected just ventral of the dorsal fin, before removal use knife to remove dirt and slime coat from scales.
- Take approximately 20 scales and place into an envelope with the corresponding sample ID number.



Structure Processing

Otoliths

- Must be careful with otolith processing structures are very fragile.
- Water is used to clean off any dried blood.
- Dried with a paper towel then placed back into microcentrifuge tube.

Scales

- Make up a Pancreatin solution 500 mL water with 3.5g Panreatin. Place on stir plate and let mix for approximately 10 mins.
- Place approximately 10 scales into a centrifuge tube (one sample per centrifuge tube).
- Avoid selecting regenerated scales.
- Fill each centrifuge tube with 15-20mL of Pancreatin solution then place in sonicator.
- Each batch will contain 10 samples, run for 15 mins.

- Remove samples from sonicator and empty scales into a fine mesh strainer one sample at a time.
- Wipe, rinse, and dry scales.
- Place scales between two glass slides tapping the ends together and labeling one side with the corresponding sample ID number.

Age Interpretation

Both aging structures are viewed using a digital camera fixed with adjustable zoom optics and Image-Pro Insight® software.

Otoliths

- Set scope lens to 1.0x with reflected light.
- Immerse otoliths in mineral oil sulcus down on top of a black background.
- Annuli counted from the middle outward, counting the edge as the last annuli.
- Annuli are identified at the edge of the hyaline bands.
- The pararostrum is the clearest part of the otolith to age.

Scales

- Set scope lens to 0.5x with transmitted light.
- Annuli are identified as continuous, concentric lines that must pass through the baseline (first transverse groove that separates the anterior and posterior portions of the scale) and are present in both the anterior and posterior portions of the scale.
- Adjust the mirror and lighting so the annuli can be viewed crossing over the baseline.
- Annuli counted from the middle outward, counting the edge as the last annuli. (Fig. 1 & 2)
- The first dark band is the freshwater zone not the first annuli. (Fig. 1 & 2)
- Slight variations in scale appearance between alewife and blueback herring in terms of aging. (Fig. 1 & 2)
- False annuli will not cross over the baseline and cannot be followed throughout the scale. (Fig. 3)
- Typically the second annulus is the “strongest” looking. (Fig. 4 & 5)
- Annuli can become crowded together at the edge of the scale, but will separate back out beneath the baseline. Should be counted as separate annuli. (Fig. 6)
- Annuli can resorb back over previous annuli, but will separate back out beneath the baseline. Should be counted as separate annuli. (Fig. 6)
- Spawning marks are identified as annuli with breaks and fractures running through the band as opposed to non-spawning mark annuli that has smooth band formation. (Fig. 6)
- Spawning marks are typically easier to identify than normal annuli due to obvious irregularities visible on the scale.
- Annuli and spawning marks must be identified on multiple scales from the same fish in order to be considered a true annulus or spawning mark.

Production Aging

Two independent age and repeat spawn mark determinations as well as agreement on age and repeats are sought for each fish. When possible, a third independent reader resolves differences, however; in the event a third reader is unavailable, the two agers will review each disagreed upon sample in an attempt to reach a consensus age. If a consensus age cannot be resolved the sample will be excluded from any further analysis.

Comparison of age and repeat spawning mark assignments among readers are analyzed using a standard precision template developed by NOAA's Northeast Fisheries Science Center. Templates can be found at http://www.nefsc.noaa.gov/fbp/age-prec/. Precision is evaluated by examination of the mean coefficient of variation (CV), percent agreement and the Bowker's test of symmetry. Aging laboratories around the world view a measure of mean CV of 5% or less to be acceptable (Compana 2001).

References

Compana, S.E. 2001. Accuracy, precision and quality control in age determination, including a review of the use and abuse of age validation methods. Journal of Fish Biology 59: 197-242

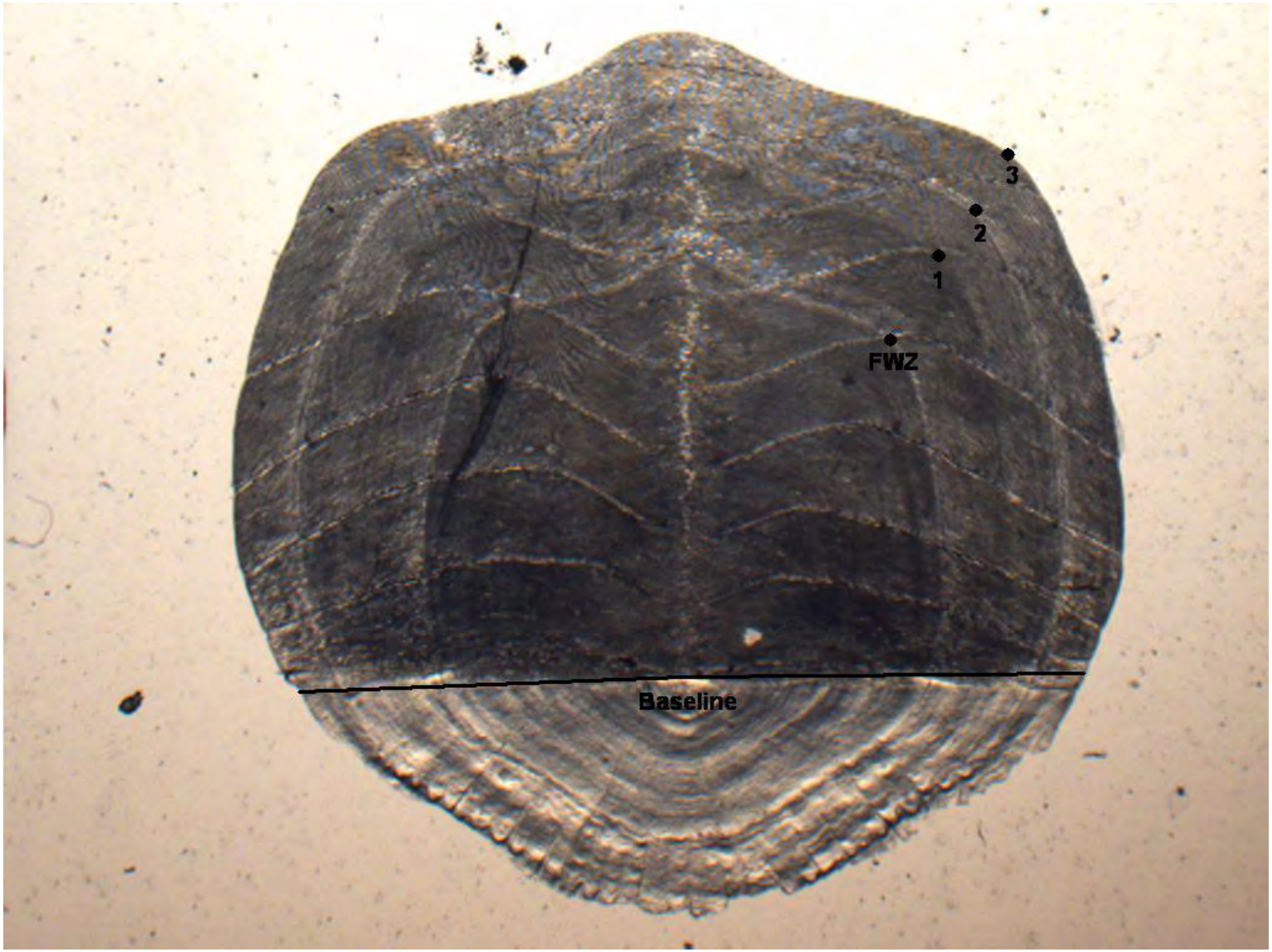


Figure 1. This 3 year old alewife has its baseline, fresh water zone (FWZ) and annuli all marked. Note the straight baseline and large FWZ typical of alewives.

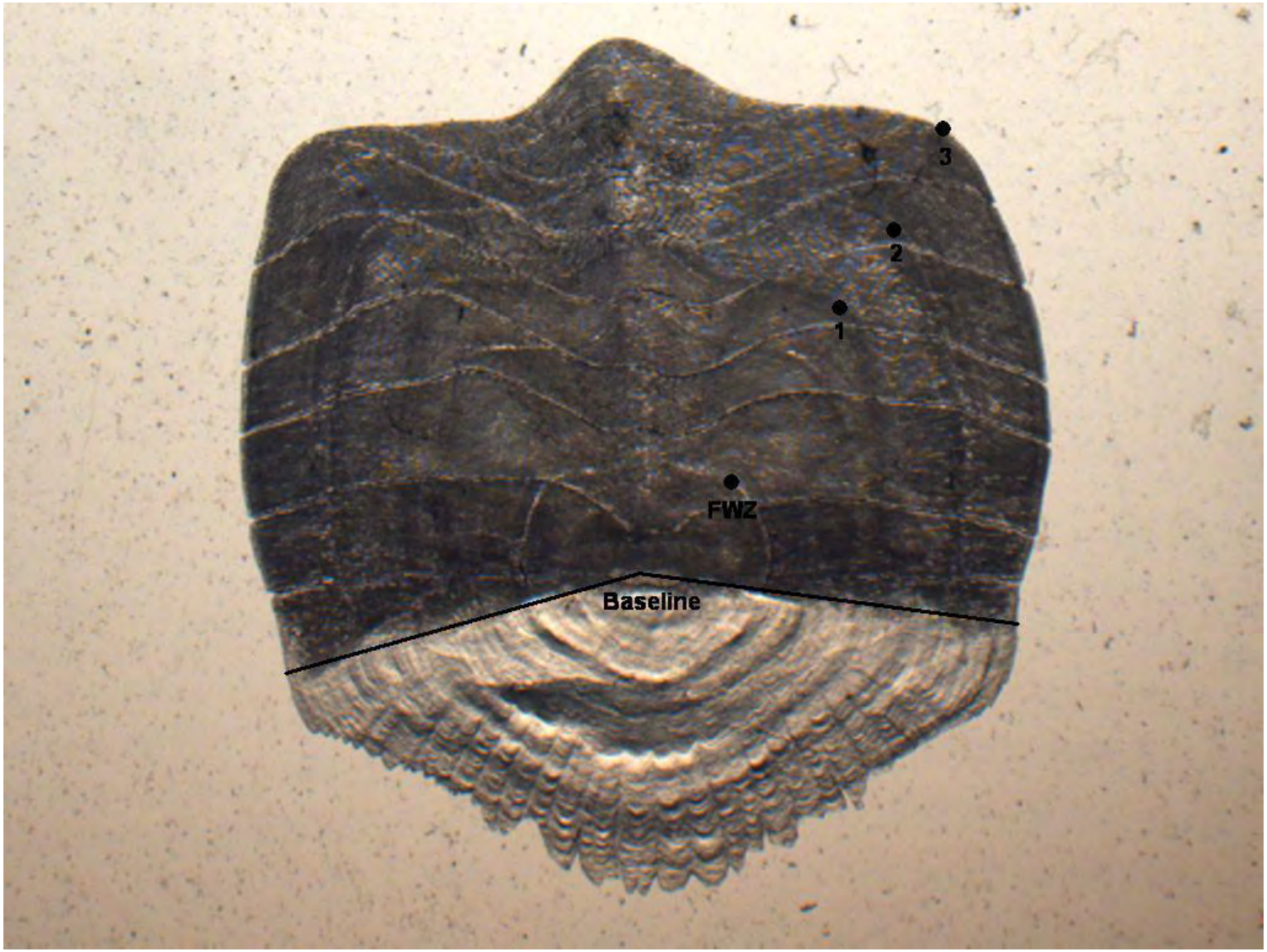


Figure 2. The baseline, fresh water zone (FWZ) and annuli are all marked on this blueback scale. Note the small FWZ and angled baseline typical of bluebacks.

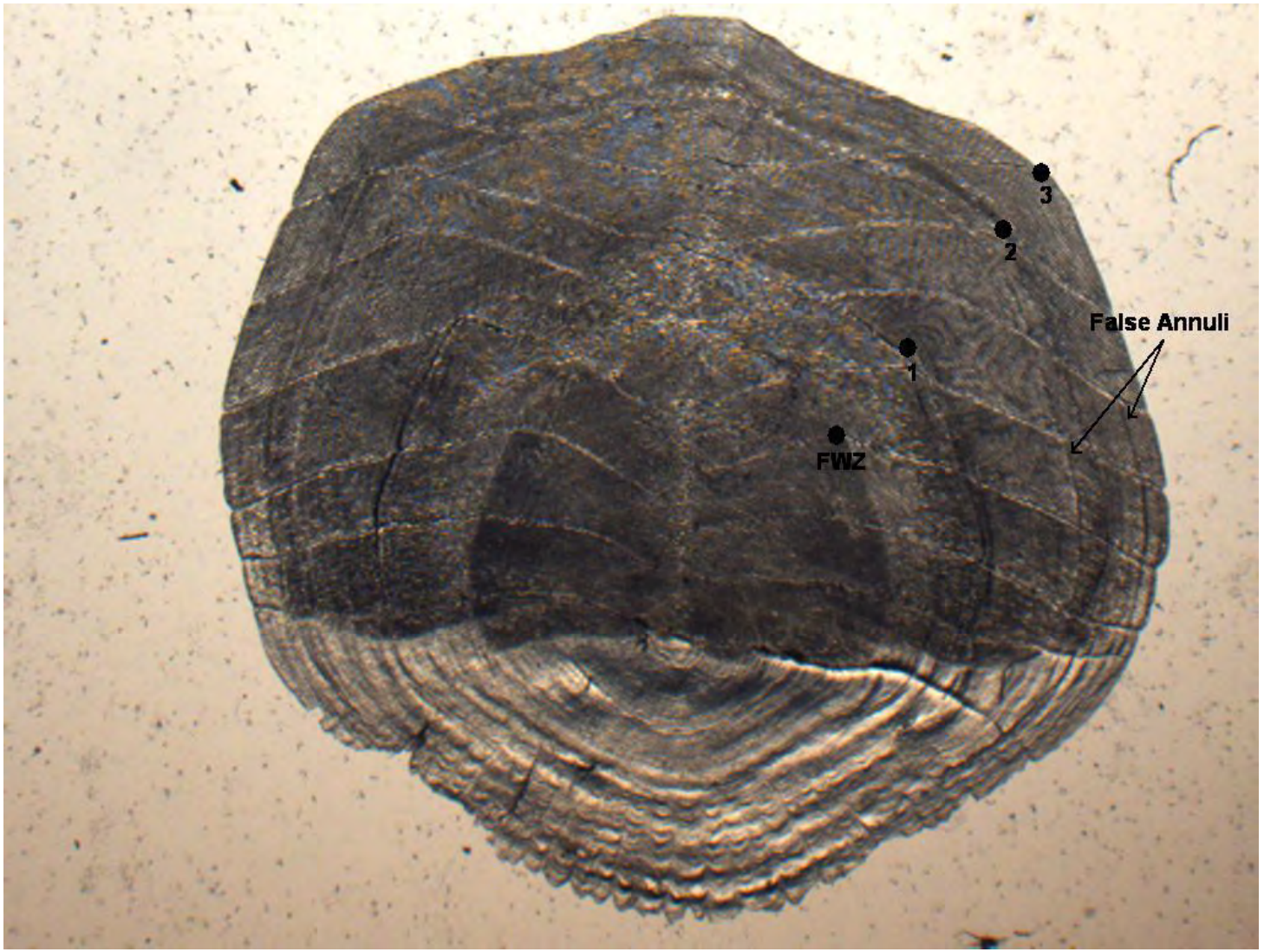


Figure 3. This three year old alewife has two false annuli, one on either side of annulus 2.

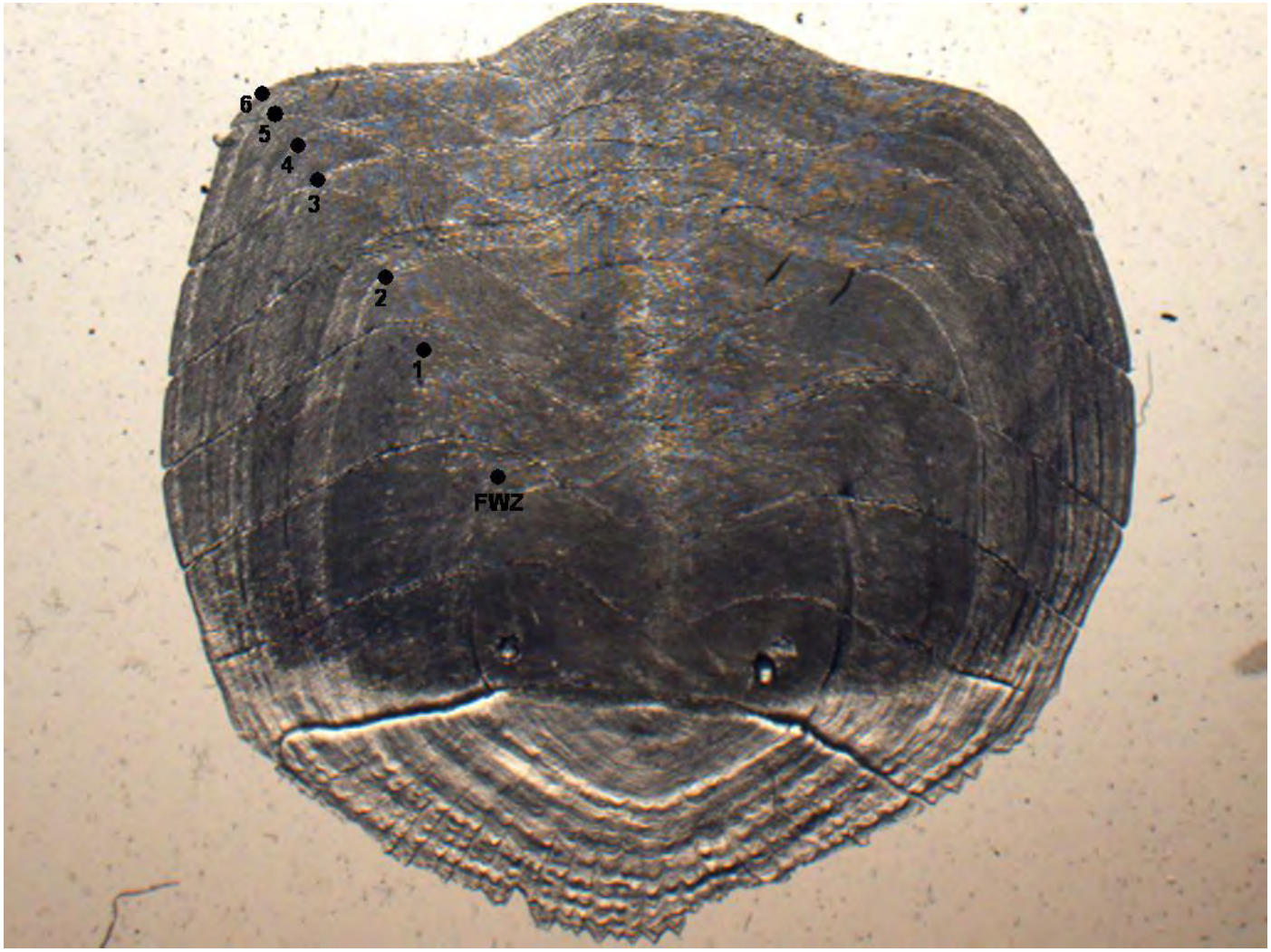


Figure 4. A six year old alewife. Note how weak the first annulus appears compared to the second.

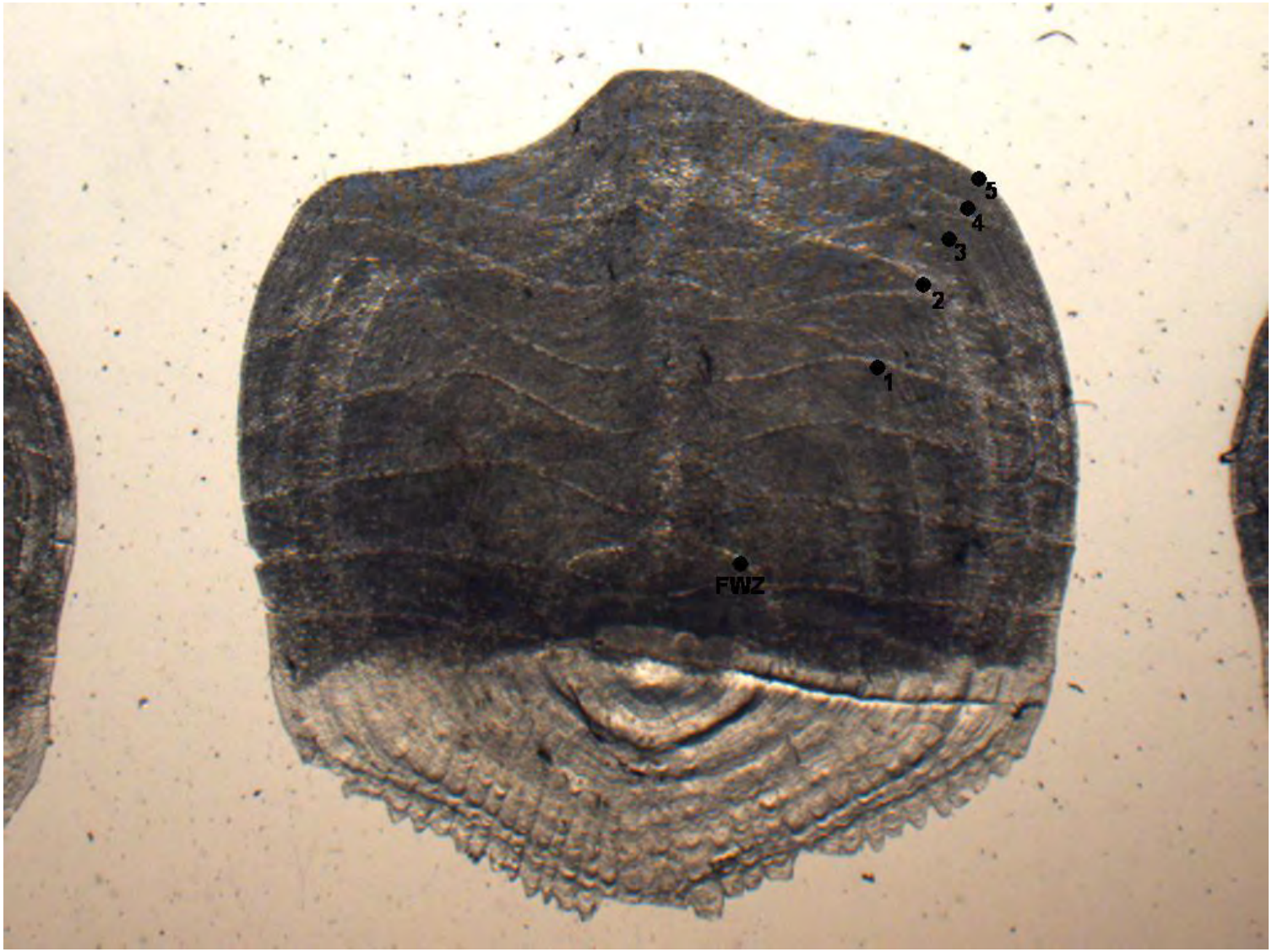


Figure 5. This five year old blueback has the typical strong second annulus.

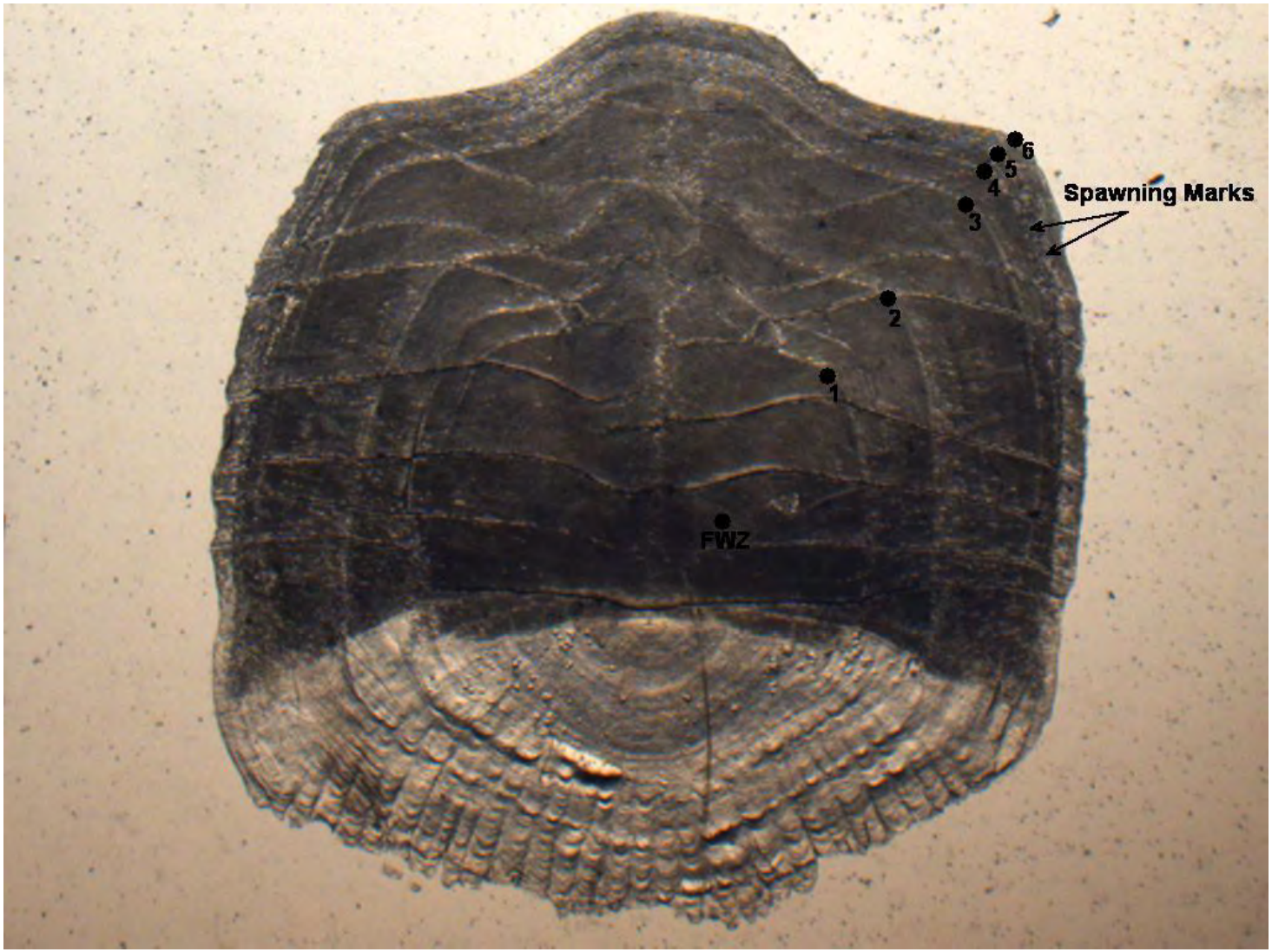


Figure 6. This six year old blueback has spawning marks at its 4th and 5th annuli.

Delaware River
Sustainable Fishing Plan for American Shad

Prepared by:

The Delaware River Basin
Fish & Wildlife Management Cooperative

Delaware Division of Fish and Wildlife • *New Jersey Division of Fish and Wildlife*

Pennsylvania Fish and Boat Commission • *New York Division of Fish & Wildlife, Division of Marine Resources*

U.S. Fish and Wildlife Service • *National Marine Fisheries Service*

and

Liaisons

National Park Service • *The City of Philadelphia Water Department*

Delaware River Basin Commission • *The Nature Conservancy*

For:

The Atlantic States Marine Fisheries Commission
Shad and River Herring Management Board

March 2022

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Executive Summary

The Atlantic States Marine Fisheries Commission's (ASMFC) Amendment 3 to the Interstate Fishery Management Plan for Shad and River Herring requires states to submit Sustainability Plans for continuance of American shad fisheries in their jurisdictional waters. Within the Delaware River Basin, the Delaware River Basin Fish and Wildlife Management Cooperative (Co-op) is responsible for the management of American shad. Previous 10-years management were codified in the original 2012 Sustainable Fisheries Plan (2012 SFP) and subsequent update in 2017 (2017 SFP), both as approved by ASMFC. These plans were based on time-series relative benchmarks for population and fishery measures. The Co-op is seeking renewal of their Sustainable Fishing Plan (SFP) of the Delaware River American shad stock for the next 5-year cycle, 2022 – 2026. The proposed SFP retains all previously defined indices. An additional index was added to this updated plan to monitor total mortality of female American shad in the Delaware River. The total mortality of female American shad is based upon the 2020 ASMFC Stock Assessment (ASMFC 2020) methodology and associated benchmark. The Co-op judge these fisheries as sustainable while avoiding diminishing potential stock reproduction and recruitment as long as all six indices of stock condition remain within the defined benchmarks.

Currently the Delaware River American shad stock is experiencing unsustainable adult female mortality as determined in the 2020 ASMFC Stock Assessment (ASMFC 2020). The 2020 assessment found total mortality, determined by Z estimates, was 1.3 for the Delaware River Basin, which was above the benchmark of 1.07. Juvenile production as measured by juvenile abundance indices (JAI), assessed by seine surveys in both non-tidal and tidal reaches, has varied without trend. Below average production was observed in non-tidal reaches from 1998 to 2002, but excellent year classes were observed in both JAI indices in 1996 and 2007. The 2013 JAI was the highest of the tidal reach time series, and that index has been higher than the 50th percentile of the time series in three of the past five years. The non-tidal JAI has had two years of the past five that were higher than the 50th percentile of the time series. Measures of relative adult abundance at Smithfield Beach were suggestive of declining abundance in early 1990s followed by low but stable levels from 1999 to 2009. The 2020 ASMFC Stock Assessment found no trend in abundance for Smithfield Beach. The Smithfield Beach female CPUE has been above the 50th percentile of the time series for three of the past five years.

Commercial exploitation of the Delaware River American shad stock is permitted by the States of New Jersey and Delaware within the tidal and estuarine portions of the Basin. Harvest occurs generally during the spring spawning migration from late February into May principally using anchored or drift gill nets. In the 2012 SFP, the Co-op acknowledged that the commercial fishery in the Delaware Bay exploited American shad from mixed stock fisheries, along with Delaware River stock. In the 2017 SFP, the location of the demarcation line was from Bowers Beach, DE to Gandys Beach, NJ with 60% of landings assigned to the mixed stock south of the demarcation line. Additional genetic evaluation of the commercial catch since the 2017 has determined that the mixed stock is exploited throughout the entire fishery and the

demarcation line was removed for this updated SFP. For this update SFP, 50% of all commercial catch will be assigned to the mixed stock, and the remaining will be assigned to landings on the Delaware River stock. Landings on the mixed stock were highest in the early 1990s and have been generally declining since that time. Landings on the mixed stock have been below the 50th percentile of the time-series since 2015.

Fishers in New Jersey represent a small directed fishery for American shad; whereas, landings of shad reported to the State of Delaware occur in the spring gill net fishery. Trends of combined landings, representative of the Delaware River stock, have been declining since 1990, with lowest levels observed in the most recent years (2008-2019), with the exception of a high harvest in 2014. The decline is most likely due to gear changes in Delaware's striped bass quota driven fishery and the low number of New Jersey fishers seeking American shad. To reduce mortality on the Delaware River stock, quotas are being proposed for both Delaware and New Jersey and Delaware will also be implementing a gear modification (thicker twine size to 0.52-mm) in the SFP update. The proposed quotas represent a cap on landings set at approximately 33% reduction from the most recent 10-years, excluding 2014 as an anomalous year.

In addition to the Delaware Bay fisheries, a small haul seine fishery (Lewis haul seine) occurs in the Delaware River, some 15 miles above the fall line at Lambertville, NJ. This fishery exists as an eco-tourism venture with nominal harvest of shad. The 2020 ASMFC Stock Assessment found an increasing trend in adult abundance for the Lewis haul seine. Co-op members will continue to annually contract with the Lewis haul seine fishery for characterizing the American shad spring-time spawning migration, as the fishery represents a considerable time-series (1925 – present-day).

Historically, a substantial recreational fishery for shad existed in the non-tidal reaches of the Delaware River. Angler participation, effort, harvest, and their behaviors is unknown. Anecdotal reports suggest most shad anglers practice catch-and-release. The mortality associated with catch-and-release of shad in the Delaware River is unknown, but considered to be minimal based on studies in the Hudson River. The recreational creel limit is currently 3 American shad in the Delaware River, bay, and tidal tributaries. To reduce mortality on the Delaware River stock, the creel limit is being proposed to be reduced to 2 American shad in the SFP update.

In addition to harvest and natural mortality, the Co-op investigated other factors that may also impact the Delaware River stock. Flow management in the Delaware River is highly regulated, particularly in the upper portion of the Basin. Co-op members are active in management groups to ensure flow management is protective of American shad spawning and supports nursery habitat. Invasive species, such as northern snakehead, blue catfish, and flathead catfish are recent introductions to the basin that could potentially increase predation on American shad. Possible losses from oceanic commercial fisheries principally, as bycatch, have been difficult to evaluate; but, the Co-op is concerned these offshore fisheries may be having a

negative impact on the Delaware River stock. As part of the American shad restoration program for the Schuylkill and Lehigh rivers, the Pennsylvania Fish and Boat Commission (PFBC) estimates the contribution of otolith-marked hatchery shad to the returning adult spawning populations in both rivers. While evidence suggests these fry stockings substantially support the runs in the Schuylkill and Lehigh rivers, the contribution to the main stem Delaware run above their respective confluences has been minimal. Multiple water intake structures are found in the Delaware River and upper estuary that may be causing mortality on American shad eggs, larvae, and juveniles through impingement and entrainment. The Co-op is actively commenting on water intake projects to improve protections for shad at those facilities. Additional habitat alterations in the basin from dams and other barriers reduces access to spawning and nursery habitat for shad in tributaries to the Delaware River. Co-op members are actively working to support dam removals and improved fish passage in basin tributaries (see DRBFWMC 2021 and DeSalvo et al. 2022).

The Co-op proposes six benchmarks for sustainability. The benchmarks have been set to respond to any potential decline in stock on increased exploitation. Thus all benchmarks are viewed as conservative measures. Failure to meet the defined benchmark(s) trigger consideration of immediate management action. The severity of the action will be commensurate to the number of benchmarks exceeded. All benchmarks will be reviewed annually as part of the ASMFC Annual Compliance Report submission.

- **Total Mortality:** This index is calculated as the adult female total mortality $Z_{40\%}$ estimate. It is calculated from the three-year average female Z estimate from otoliths from Smithfield Beach. The benchmark is based on data from 2005 – 2017 and failure is defined as the three-year rolling average with values above a value of 1.07 (i.e., $Z_{40\%}$).

- **Non-tidal JAI:** This index is derived from the New Jersey Division of Fish and Wildlife (NJDFW)/Co-op annual fixed station seining in the non-tidal Delaware River main stem at Phillipsburg, Water Gap, and Milford. The non-tidal JAI is standardized with respect to environmental covariates using generalized linear model methodology. The benchmark is based on data from 1988-2007 and 2012-2019. Failure is defined as the occurrence of three out of five years where JAI values fall below a value of 188 (i.e., the 50^{th} percentile of the historical data).

- **Tidal JAI:** This index is derived from the NJDFW annual striped bass seining in the upper estuary. Only those stations from Newbold Island to the Delaware Memorial Bridge are included. The JAI index represents the annual geometric mean of the catch data. A benchmark was based on data from 1987 – 2019. Failure is defined as the occurrence of three out of five years where JAI values fall below a value of 5.81 (i.e., the 50^{th} percentile of the historical data).

- **Adult CPUE:** This index is based on the annual geometric mean of female CPUE (shad/net-ft-hr) in the PFBC gill net, egg-collection effort at Smithfield Beach. The benchmark was based on sampling from 1996-2019, with failure defined as the occurrence of three out of five years where index values fall below a value of 0.52 (i.e., the 50th percentile of the historical data).

- **Ratio of Harvest to Smithfield Beach CPUE:** This index is calculated as a ratio of the combined commercial harvest of the Delaware River American shad stock, in pounds, divided by relative abundance of adult female survivors captured at Smithfield Beach (Adult CPUE index) divided by 100. The benchmark is based on data from 1996-2019 and failure is defined as the occurrence of three out of five years where values are above a value of 799 (i.e., the 50th percentile of historical data).

- **Mixed Stock Landings:** This index is calculated as the annual landings from the mixed stock fishery. It is calculated as 50% of total commercial shad landings combined reported to the states of Delaware and New Jersey. The benchmark is based on data from 1985 – 2019 and failure is defined as the occurrence of 2 consecutive years with values above a value of 18,505 pounds (i.e., the 25th percentile of historical data).

It is anticipated that this sustainability plan will reduce mortality on the Delaware River American shad stock while allowing for human use of the resource. The Co-op views this plan having a five-year term beginning with its acceptance by the ASMFC.

Sustainable Fishery Plan for the Delaware River

1. Introduction

In accordance with guidelines provided in Amendment 3 to the Interstate Fishery Management Plan for Shad and River Herring (ASMFC 2010), the Delaware River Basin Fish and Wildlife Management Cooperative (Co-op) had the first American Shad Sustainable Fishing Plan (SFP) accepted by the Atlantic States Marine Fisheries Commission (ASMFC) Policy Board in 2012 (2012 SFP) and an updated plan that was approved by the Board in 2017 (2017 SFP) for management use through 2021. This document (i.e., 2022 SFP) represents a revised SFP for governing management of American shad over the next five-year term, 2022 – 2026, pending final approval by ASMFC. It is submitted jointly by the States of Delaware, New Jersey, and New York, and the Commonwealth of Pennsylvania, for management of American shad in waters of the Delaware River Basin (Figure 1).

The 2017 SFP built upon the progress made during the tenure of the 2012 SFP including adding a mixed stock landings fishery benchmark to address the harvest of out of basin stocks in the lower bay fishery. During 2017 SFP tenure a new genetic sampling program was undertaken to help better inform managers of the stock structure of the lower bay landings and better define stock delineation for the mixed stock fishery benchmark. Additionally, for the 2017 SFP the non-tidal JAI was standardized using a GLM to account for environmental covariates during sampling and the benchmark and associated trigger are now based upon these standardized index values.

The 2022 SFP was updated to address the outcome of the ASMFC's 2020 American Shad Benchmark Stock Assessment which found American shad stocks to be depleted coast-wide with adult mortality within the Delaware Basin assessed as unsustainable. With these findings in mind, the Co-op chose to address the benchmark levels and associated triggers for all five of the benchmarks from the 2017 SFP as well as incorporating a new mortality benchmark based upon analyses conducted during the stock assessment. The changes in benchmark levels, management triggers, and the addition of the mortality-based benchmark represents an effort by the Co-op to more conservatively manage the American shad resource within the Delaware Basin in light of the 2020 assessment findings.

Status updates of monitoring programs supporting the 2022 SFP and associated benchmarks will be reported in annual compliance reports to ASMFC. Annual reports are jointly submitted by the Co-op.

1.1 Request for Fishery

The Co-op desires that the Shad and River Herring Management Board consider this request to approve a Sustainable Fishery Plan for American Shad of the Delaware River Basin. This plan includes a request for approval of both recreational and commercial harvest within the entirety of the main stem Delaware River and its tidal tributaries in the states of Delaware, New Jersey, New York, and Pennsylvania. Accordingly, the Co-op justifies this request based on analysis of historical trends in juvenile and adult relative abundance, and commercial and recreational fishery data.

1.2 Definition of Sustainability

Amendment 3 to the Interstate Fishery Management Plan for Shad and River Herring defines a sustainable fishery as one that will not diminish potential future stock reproduction and recruitment. The Co-op proposes that reproduction and recruitment in the Delaware River American shad stock be measured by two indices of age zero abundance to be augmented with an index of spawning stock abundance, a ratio of landings to that index of spawning stock abundance, and a mixed stock fishery index. Benchmarks have been proposed for all indices to define levels needed to reduce mortality and avoid diminishing potential stock reproduction and recruitment. We will judge fisheries as sustainable if indices of stock condition remain within these benchmarks; otherwise, exceedance will necessitate corrective management actions. In light of the findings of the ASFMC's 2020 Stock Assessment, a female adult mortality index and associated benchmark value and management trigger has also been incorporated into the 2022 SFP.

2. Stock Status

2.1 Previous Assessments

The Delaware River was included in the 1988, 1998, 2007, and 2020 ASMFC coast-wide stock assessments for American shad (Gibson *et al*. 1988; ASMFC 1998, ASMFC 2007, ASMFC 2020). The 1988 Assessment utilized the Shepherd stock-recruitment model to estimate maximum sustainable yield (MSY) and maximum sustainable fishing rates (F_{msy}). That assessment estimated F_{msy} for the Delaware River to be equal to 0.795 with exploitation at MSY at 0.548. The historical fishing rate for the Delaware River stock was estimated to be F = 0.320. The 1998 Assessment utilized the Thompson-Bell yield-per-recruit model to derive an overfishing definition (F_{30}) for American shad. Average fishing mortality from 1992 to 1996 for the Delaware River was estimated at F = 0.17, which includes out-of-basin estimates of harvest, and was considered well below the F_{30} value of F = 0.43. The 2007 assessment found the Delaware River stock of American shad declined through the 1990s and remained at low levels. The cause of the decline was not identified, nor was any explanation postulated for why the stock

remained at low levels since the decline. The 2007 assessment concluded that juvenile production remained stable without any apparent trend, and did not appear to be correlated between adult abundance or returning adults in subsequent years (ASMFC 2007). The stock assessment sub-committee was unable to reach consensus on what could be considered the best scientific benchmark(s) from the available datasets (ASMFC 2007).

The most recent stock assessment was completed in 2020 (ASMFC 2020). The assessment used a modified Thompson-Bell spawning biomass per recruit (SBPR) model and weighted linear regression total mortality estimators to develop a total mortality estimate and Z_{40} threshold for the Delaware Basin. The assessment found that recent female adult mortality in the Delaware Basin (1.3) was above the established Z_{40} threshold of 1.07 (ASMFC 2020). Neither juvenile nor adult abundance could be determined due to conflicting trends in multiple data sets over the time series that were available for analysis.

2.2 Stock Monitoring Programs

2.2.1 Fishery Independent Surveys

2.2.1.1 Juvenile Abundance Surveys

In the tidal Delaware River, NJDFW collected data pertaining to young-of-year (YOY) American shad during their annual striped bass recruitment survey. Since 1980, seining was accomplished using a 100-ft (30.48 m) by 6-ft (1.83 m) bagged seine of 1/4 inch (6.35 mm) delta mesh, during daylight hours. A series of fixed station sites were sampled twice a month from June through November. November sampling was discontinued in 2016. Catches from sites were combined into two general regions. Region 2 represents sites (n = 16) from the Delaware Memorial Bridge, RM 70.9, to the Philadelphia Naval Shipyard, RM 94.4; whereas Region 3 represents sites (n = 8) from just north of the Betsy Ross Bridge, RM 105.8 to Newbold Island, RM 125.4. Data from lower Delaware Bay sites were eliminated where YOY American shad are less likely to be encountered in higher salinity waters. The tidal index is generated using the shad catches from Regions 2 and 3 during the months of August through October and is expressed as a catch per haul geometric mean. In 2015, a QA/QC check was completed on all data sets from the Delaware River resulting in updates to the recruitment indices during the time-series and in 2020 sampling was not completed due to the COVID-19 pandemic.

The tidal JAI increased from 1980 through 1996 and the yearly index values have been highly variable since (Figure 2). Multiple strings of very good year classes followed by poor year classes have been observed through the entire time series with some of the best year classes and some of the worst year classes being observed in the last ten year of the time series. This highly variable nature suggests that year class strength may be more strongly influenced by external/environmental factors beyond adult abundance. This idea is further supported by the lack of correlation between the yearly adult and juvenile indices that are calculated for this SFP.

The tidal JAI will continue to be calculated as a GM of annual catch for the duration of the 2022 SFP.

The NJDFW conducted night-time beach seine sampling (300-ft x 12-ft bagless, knotless ¼-in delta mesh) targeting YOY American shad in the non-tidal Delaware River. Beginning in 1979, only a single site, Byram (RM 157.0), was sampled. Multiple additional sites were added in subsequent years, including Trenton (RM 131.6), Phillipsburg (RM 184.2), Water Gap (RM 210.0) and Milford Beach (RM 246.4), initiated in 1980, 1981, 1983, and 1988, respectively. The non-tidal seining was discontinued following the 2007 season. Justification was based on finding a significant correlation relating the non-tidal and tidal beach seining, suggesting that YOY shad abundance followed similar trends from both seine surveys.

Beginning in 2012, the Co-op reinitiated the NJDFW non-tidal beach seine survey for annual monitoring American shad YOY production. Four sites (Trenton, Phillipsburg, Water Gap, and Milford Beach) were annually surveyed following the original NJDFW protocols. Subsequent evaluation determined that catches from the Trenton fixed station did not significantly contribute to improved index performance (2017 SFP). Consequentially, the non-tidal JAI time-series index (1988-2007, 2012-2019) excluded catches from the Trenton station (2017 SFP). The present-day non-tidal index is composed only of the combined catches from Phillipsburg, Water Gap, and Milford fixed stations (i.e., informally referred to as the Big 3), as representative of the juvenile shad production for the non-tidal Delaware River. Sampling effort, however, remains on-going at all four of the traditional fixed stations.

Data standardization model development (i.e., generalized linear model, GLM) improved the precision and accuracy of the Big 3 JAI (2017 SFP). Amendment 3 to the ASMFC to the Interstate Fishery Management Plan for Shad and River Herring requires JAIs to be expressed as geometric means (GM) or area under the curve (AUC; ASMFC 2010), with associated confidence limits. For the 2022 SFP, the non-tidal JAI will continue to be expressed both as a GM and a GLM; however, the benchmark for the non-tidal JAI will be based on the GLM analysis. The Co-op considers the GLM as providing a more robust JAI index than can be indexed by geometric means.

The juvenile shad abundance from the non-tidal reaches of the Delaware River were highly variable annually (Figure 3). The top five ranked years in the Big 3 GLM estimates were 1996 (2^{nd}), 2007 (4^{th}), 2012 (3^{rd}), 2017 (1^{st}), and 2019 (5^{th}). The remaining years since 2012 (i.e., 2013 -2016) had GLM values ranging from 52.5-162.4, which were below the time-series average of 214.3. No sampling was accomplished in 2018 due to sustained high river conditions from rainfall, or in 2020 due to the COVID-19 pandemic. The highly variable nature of the non-tidal JAI suggests that environmental conditions strongly influence successful shad production and capture.

The upper Delaware Basin, above Port Jervis, NY (RM 254), represents considerable potential shad juvenile production. Additional fixed-stations were prosecuted with the intent for quantifying juvenile shad production relative to the Big 3. An initial site located at Lackawaxen (RM 277), implemented from 2012 to 2014, was discontinued due excessive submerged aquatic vegetation precluding effective seining. Alternative sites at Skinner's Falls (RM 295) and Fireman's Park (RM 0.5, East Branch Delaware River) were identified based on findings from a one-year synoptic survey conducted by the National Park Service (NPS) in 2015. Seining, following the original NJDFW protocols, for juvenile shad at these two stations were initiated in 2016 and continue to present date. Catches from these two up-basin stations are reported separately as geometric means and have not been incorporated into the Big 3 index.

Interpretation of geometric means of juvenile shad for the upper Delaware Basin remains tenuous, given only three years of data (2016-2017 and 2019) are available. The upper Delaware Basin sampling is not reflective of the Big 3 catches during the few years of sampling (Figure 4). During peak catches in the Big 3 in 2017, no juvenile shad were caught at Fireman's Launch and the Skinner's Falls catch (GM: 8 shad/haul) showed a decline from 2016 (40 shad/haul). River conditions likely influence catchability at the both upper Delaware Basin stations (i.e., river flow tends to collapse the net during deployment and retrieval). Yet, anecdotal observations suggest strong presence of juvenile shad at both stations. Co-op members will maintain sampling effort at these two upper Delaware Basin stations to establish a longer-term time-series for comparability.

The 2012 SFP found significant complimentary trends among the non-tidal and tidal JAIs. These relationships, to some extent, have since deteriorated. Previous relationships relied upon co-occurrences of peak year-classes, specifically 1996 and 2007 (Figure 5). Since 2012, the JAIs tended to demonstrate mismatched time-series peaks (1988-2019; Spearman's Rank: $r = 0.177$; $p = 0.377$). This recent disparity between the two indices suggests regional divergence of year-class production success.

Amendment 3 defines recruitment failure as occurring when three consecutive JAI values are lower than 75% of all other values in the data series (ASMFC 2010). To address the recent 2020 ASMFC Stock Assessment report, which indicated that the total mortality of the Delaware River Basin stock of adult American shad is unsustainable and Delaware Basin shad abundance is unknown, benchmark values for JAIs were made more conservative. Recruitment failure is now defined occurring when 3 out of 5 years of JAI values are lower than 50% of all other values in the time-series. The Co-op has adopted this definition for both the non-tidal and tidal JAI benchmarks. These are calculated as the 50^{th} percentile, using the "quantile" function in the R package or "percentile.inc" function in Microsoft Excel spreadsheets. Years to be included in the benchmark calculation were determined by using years where sampling techniques and/or locations were standardized. The non-tidal benchmark includes years 1988 to 2019 and the tidal benchmark includes years 1987 to 2019.

2.2.1.2 Adult Abundance Indices

Co-op members annually monitor the relative abundance of returning spawning adult shad in the Delaware River. Monitoring occurs after the commercial fishery is executed, such that captured shad represent survivors from the fishery. This effort is currently being accomplished at Smithfield Beach (RM 218) as a gill net survey on actively spawning adults and fish passage counts through fishways on the Lehigh and Schuylkill rivers.

2.2.1.2.1 Gill Net Survey

Collections at Smithfield Beach principally focus on capture of brood fish and subsequent strip-spawning to produce fertilized eggs in support of the PFBC restoration efforts in the Schuylkill and Lehigh rivers, the largest tributaries to the Delaware River. Night-time gill netting (8 - 20 nets per night, 4.0-in. – 6.0-in. stretch mesh, 200-ft x 6-ft) occurs when the river achieves consistent temperatures 16.0 – 21.0 ^{o}C which is typically the second week of May through the first week of June. The total number of net sets by mesh size per night depends on the previous nights' catch for maximizing female captures. Size selectivity from gill net gear is perceived as minor based on previous assessments (2017 SFP). Occurrences of entanglement can be as frequent as gilled shad. Likely the high rates of capture by entanglement contributes to all sizes of stretch mesh potentially capturing all sizes of shad. Historical collections were initiated in 1990, but biological data (length, weight, scale/otolith structures) were not recorded prior to 1996.

Total catch at Smithfield Beach varied among years (Figure 6). Greatest total numbers of captured shad occurred in 1995 (n = 1,398), with several other early years (i.e., 1990–1994, 1997-1998) in the time-series also having large total catches (> 1,000 individuals). Conversely, low shad catches (< 400 shad) also occurred in multiple years including 2002 (n = 400), 2006 (n = 356), 2009 (n = 372) and 2019 (n = 226). The observed low catch in 2019 was likely influenced by consistent high flows experienced for the duration of the 2019 season that prevented nets from hanging open and required an alternative deployment of directly setting nets adjacent (< 2-m) to the shoreline, rather than more mid-channel. The modified sampling procedure coupled with the high flow conditions likely resulted poor catchability throughout the 2019 season and sampling was likely a poor representation of population abundance.

Observed sex ratios in any given year is dependent on the frequency of gill net mesh sizes deployed. The frequency of stretch mesh sizes used varied among years (Figure 7). The use of 4.5-in and 5.0-in stretch mesh nets tended to be principally deployed in any given year to support broodstock collections. The increased use of the 4.75 inch stretch mesh size in later years (i.e., post 2012) was due to a perceived need to increase the male to female ratio for improved egg viability. Nightly deployment of a single net of 4.0-in stretch mesh was initiated in 2016 targeting small shad observed routinely passing through the 4.5-in gill nets. A 4.0-in, 5.75-in, and 6.0-in stretch mesh nets were not deployed in 2019, however, due to limited shoreline

availability without losing the net due to unfavorable river conditions. Use of large (≥ 5.5-in) stretch mesh sizes were not as commonly deployed as smaller stretch mesh sizes, due to the perceived lack of catch, during later years.

Most of the Smithfield Beach catch occurred in two stretch mesh sizes (Figure 8). The 5.0-in stretch mesh typically captured 27.0% to 58.4% of all females; however, in 2016 and 2017, the 4.75-in stretch mesh net caught the highest percentage (30.2% and 39.0%, respectively) of females in those years. Likely this was related to the increased deployment of the 4.75-in nets in those years. Female shad were routinely caught in all other stretch mesh sizes, but in lesser quantities. The 4.5-in stretch mesh typically captured 24.3% to 69.1% of all males. The 5.0-in and 4.75-in stretch mesh nets also captured some of the male total catch, 8.3% to 48.0% and 2.2% to 26.3%, respectively. The other larger stretch mesh sizes (> 5.25-in stretch mesh) caught few (< 10%) males whereas the use of the 4.0-in stretch mesh successfully captured small-sized males (9.4% to 27.1%) in 2016 to 2018.

Observed annual size distributions of captured shad varied among years for both female and male shad (Figure 9). Female total lengths ranged from 402-mm TL (2018) to 644-mm TL (2003), with median sizes between 516-mm TL (2010) to 571-mm TL (2003). Generally, males are smaller sized than females. Total lengths ranged from 398-mm TL (2005) to 615-mm TL (1996), with median sizes between 468-mm TL (2009) to 454-mm TL (2002).

The Delaware River American shad spawning population was supported by a few age classes as interpreted from otolith microstructures (Figure 10). Age 5 and Age 6 typically represented the majority (> 70%) of female shad, however, these two ages were not as strongly represented in 1997 (58%), 2004 (68%), 2006 (63%), 2012 (42%), 2014 (58%), and 2019 (19%). Ages 3 and 7, typically contributed less than 1% and 10%, respectively, in any given year, but in the aforementioned years, Age 7 female shad composed a greater portion (22% - 79%) of the observed ages. Ages 8 and 9 female shad were rare (<4%) occurrences. No female shad over Age 9 were observed.

Male shad were principally (>90%) represented by Age 4, Age 5, and Age 6 (Figure 10). Age 5 male shad were commonly represented (30%–86%); whereas, in many years Age 4 or Age 6 shad were prevalent. Young (i.e., Age 2 to 3) and older (i.e., Age 7 to 9 shad) were infrequent (< 10%) occurrences, excepting in 2012 and 2019 when Age 7 shad composed 19% and 57% of the male catch, respectively.

Application of annual age-length keys provides for the estimation of mean size-at-age. Annual total catch was parsed by stretch mesh size of capture to account influences associated with gill net selectivity and annual sampling variability of various mesh sizes. Least-square regressions of the time-series demonstrate significantly declining slopes for Age 5 and Age 6 female shad in the 4.5-in to 5.0-in stretch mesh sizes (Figure 11). Inferences of mean size-at-age for catches of

female shad from mesh sizes 5.75-in to 6.0-in are tenuous given infrequent occurrence. Mean size-at-age were not investigated for male shad.

There is some evidence to suggest that female mean size-at-age is declining towards smaller sized shad (Figure 11). These declining trends are likely a shift in the population, given the perceived minor influence of gill net selectivity upon female shad capture. In later years 2011 – 2019, older (i.e., > Age 6), and presumably larger sized female shad, tended to have a greater contribution to the total catch. The observed declining trend is contrary to that assumption. However, error associated with age estimation from otolith microstructure has not been evaluated. Co-op members anticipate developing otolith age estimation protocols over the duration of this Plan. The Co-op recognizes the significance of a declining trend in female mean size-at-age, and will continue to monitor this trend.

In previous SFPs, in an attempt to get a general sense of trends in total instantaneous mortality (Z), historical age data from shad collected at Smithfield Beach were analyzed using a Chapman-Robson bias-corrected mortality estimator described in Smith et al. (2012). Total mortality was calculated for females and combined sexes on an annual basis beginning in 1997. To be consistent with the methods used in the 2012 Benchmark Stock Assessment for River Herring, the age of full recruitment was the age of highest abundance and there had to be at least three ages to be included in the respective analyses (ASMFC 2012). Female Z estimates ranged from 0.81 (2006) to 2.87 (2012).

The 2022 SFP incorporates analyses from the 2020 Stock Assessment that used a modified Thompson-Bell female spawning stock biomass per recruit (SBPR) model and weighted linear regression total mortality estimators to develop a total mortality estimate and Z_{40} threshold for the Delaware Basin (see sections 2.5 and 2.6; ASMFC 2020). After a thorough analysis of available data, it was determined that female specific ages derived from otoliths collected at Smithfield Beach provided the best quality and quantity of data for assessing adult mortality. Final Z estimates for comparison against per-recruit reference points are provided as running three-year averages to smooth variability of annual estimates from a combination of factors explored through preliminary analysis (e.g., sampling error, recruitment variation) (Figure 12).

The three-year average female estimate from otoliths in 2017 (1.3) was above the benchmark (1.07) and the average standard error for this estimate was 0.49 (ASMFC 2020). There were no female data available from otoliths in 2018 precluding estimation of a three-year average for females in 2019 from this data set.

Catch-per-unit-effort (CPUE), represented as geometric means (GM), provides relative population trends for spawning adults at Smithfield Beach. Total CPUE (females & males, combined) annual values varied (0.23–3.98 shad/net-hour) among the time-series (Figure 13). Peak abundances were observed prior to 1993 (> 2.0 shad/net-hours); after which CPUE varied 0.23–1.59 shad/net-hours. Refinement of CPUE was accomplished to focus on female catch

only, (Figure 13). The intent was a perceived improved benchmark for assessing trends of available spawning stock. Trends of female-only GM demonstrated similar patterns as the total combined CPUE, with values varying 0.21–1.07 shad/net-hours for the time-series (1996–2019). In recent years, 2016–2019, annual GM values either ranked poorly (2016: 17th; 2019: 23rd) or placed in the top ten (2017: 10th, 2018: 4th) in the time-series.

The utility of Smithfield Beach as a monitoring program for defining sustainability of the Delaware American shad is critical. Yet, the primary purpose as a broodstock source for the PFBC restoration program confounds conclusive statements on observed population biological trends. Should program objectives for the PFBC restoration efforts relax; monitoring objectives need to take priority.

2.2.1.2.2 Adult Fish Passage

Many of the Delaware River tributaries historically contained spawning runs of American shad. Unfortunately, with the development of the lock/canal systems throughout the Delaware River Basin, including the Lehigh and Schuylkill rivers in the early 1800s, shad became extirpated in many of these tributaries. Efforts have been undertaken to restore shad in the Lehigh and Schuylkill rivers by installation of fish ladders and stocking fry through a hatchery program. Fish passage monitoring exists for the Lehigh and Schuylkill rivers, but passage into many other Delaware River tributaries is unknown.

The PFBC and Philadelphia Water Department (PWD) maintain an extended monitoring time-series, characterizing total shad passage into the Lehigh River and Schuylkill rivers from the Delaware River (Figure 14). Passage is estimated from video surveillance at the Easton fishway on the Lehigh (RM 0.0) from 1995 to 2012 and at the Fairmount fishway on the Schuylkill (RM 8.4) from 2004 to 2019. After 2012, surveillance was discontinued at the Easton fishway, and was replaced using a predictive regression relationship between total passage and a one-day electrofishing survey developed from concurrent years monitored (1996–2012).

Peak passage years in the Lehigh River were identified for 2002, 1998, 2017, 2000, and 2013 respectively and 2011, 2012, 2016, 2010, and 2009 in the Schuylkill River, representing the top five years with the greatest total passage (Figure 14). No significant correlations (Pearson's: $p > 0.05$) were found between either river total passage to Smithfield Beach (female-only GM).

The lack of relationship between the Lehigh and Schuylkill rivers shad passages suggests shad runs into these rivers are not representative of the Delaware River spawning run. Co-op members agreed that Easton and Fairmount fish passage data was of no utility in assessing/monitoring the shad population within the Delaware River. No attempt was made to document downriver passage from the either river back into the Delaware River.

2.2.1.2.3 Comparison of JAI to adult indices

The two previous SFPs (2012 & 2017) attempted to explore any correlations between adult relative abundance and year class strength (juvenile production) in any given year. No obvious correlation or relationship was determined to exist. The lack of a correlation and highly variable nature of the yearly juvenile abundance indices suggests that year class strength may be more strongly influenced by external/environmental factors beyond adult abundance.

2.2.2 Fishery Dependent Data

2.2.2.1 Commercial Fisheries

Exploitation of the Delaware River American shad stock occurs in several fisheries within the Basin. Commercial harvest is permitted by the States of New Jersey and Delaware. These fisheries occur in tidal waters of Delaware and New Jersey using staked, anchored, or drifting gill nets. Fishers principally harvest shad during the spring spawning migration from late February into May. Fishers in New Jersey represent a small directed fishery for American shad; whereas, landings of shad reported to the State of Delaware occur in the spring gill net fishery, which targets striped bass.

In addition to the Delaware Estuary/Bay fisheries, a small haul seine fishery (Lewis haul seine) occurs in the Delaware River, some 15 miles above the fall line at Lambertville, NJ.

2.2.2.1.1 Lewis Haul Seine

Lewis haul seine: The Lewis haul seine is the only in-river fishery and is located at Lambertville, NJ (RM 148.7). It dates back to the late 1880's, representing a significant time-series of recorded data with catch-per-unit-effort data documented since 1925 (Figure 15). The fishery has evolved from a commercial fishery to an eco-tourism enterprise that resulted in changes to the length of net used. The fishery employed seine nets of different length depending on the water flow and height over the years. Although this may be problematic, the length of the time series still gives a good indication of spawning run strength in the Delaware River (ASMFC 2007). Since 2012, this fishery has been contractually supported by Co-op members ($6,000 annually). Requirements included a minimum of 33 days fishing in the traditional style and time-period (mid-March through June) along with reporting biological data (length, weight, scale sample) for all harvested shad to maintain the integrity of the time-series. Investigation of biological parameters of harvested shad by the Lewis haul seine have not been pursued.

The Lewis haul seine provides an index of the Delaware River American shad adult spawning run. Catches in 1963, 1981, 1989, 1992 and 1988 represent the top five highest recorded abundances of shad, respectively. In recent years, catches observed in 2013 (CPUE = 26.6

shad/haul) and 2017 (CPUE = 29.3 shad/haul) represented high relative abundance, ranking 11th and 9th overall in the 95-year time-series. No significant correlation (Pearson's: $p = 0.116$) was found between the Lewis haul seine (CPUE) and Smithfield Beach (female-only GM). Despite the apparent disparity between these indices, Co-op members will continue contracting with the Lewis haul seine. Reported CPUE by the Lewis haul seine offers insight into shad relative abundance in the lower reaches of the Delaware River that may otherwise not be documented.

2.2.2.1.2 New Jersey Commercial Fishery

Fishery Characterization and Regulations: Prior to 1998, the National Marine Fisheries Service (NMFS) estimated American shad landings for the State of New Jersey. In 1999, the NMFS estimates were combined with voluntary logbook data from New Jersey's commercial fishers. These landings data reported by NMFS date from the late 1800s to 2000, while extensive, are thought to be under-reported and considered inaccurate. In 2000, the State of New Jersey instituted limited entry and mandatory reporting for the American shad commercial fishery. American shad landings reported to the State of New Jersey are separated into two reporting regions: Upper Bay/River and Lower Bay. Historically, Gandys Beach (RM 30) was the demarcation for separating the reported landings.

These reporting forms allow insight into the fishery. Records indicate that the shad fishing season started as early as February 15 and ended as late as May 22 with mesh sizes between five and six inches typically being fished. In the past, American shad were primarily landed by drifting gill nets in the Upper Bay/River fishery while staked and anchored gill nets accounted for the majority of shad being landed in the Lower Bay. This distinct separation of gear deployed by general area is not as strong in the recent past as participation in the fishery has declined due to attrition and effort is much less consistent.

Regulations for American shad harvest in New Jersey include a limited entry/limited transferability license system, limitations on the amount and type of gear allowed to be fished, and gill net season and area restrictions enforced through a limited entry permitting system in the lower Delaware Bay. Specifically, these restrictions included gill nets can be deployed from February 1 to December 15, minimum stretch mesh size increases through the season, with 2.75 inches through February 29 and 3.25 inches March 1 to December 15. Net length is also limited to 2,400 feet from Feb 1 to May 15 and 1,200 feet from May 16 to December 15 (Table 1). A haul seine can also be used to harvest American shad from November 1 to April 30. The seine must have a 2.75-inch minimum stretch mesh and maximum length of 420 feet.

Fishery Participation: In New Jersey, as of February, 2022, there were 70 permits issued to allow harvest of American shad. The shad permit allows the holder to fish in any state waters where the commercial harvest of shad is allowed if the permit holder meets all other net requirements for commercial fishing in a particular area. Currently, only 43 of these permits are active (28 commercial and 15 incidental), due to attrition (Table 2). Since harvest reporting

became mandatory in 2000 the number of fishers landing shad in New Jersey has seen a steady decrease. From 2000 through 2006 the number of fishers landing shad averaged in the mid-twenties (range of 21-29). From 2007 through 2009 this number dropped into the mid-teens (range of 14-17), and since 2012 this number has averaged around nine fisherman landing shad in the Delaware Bay (range of 9-13). The number of fishers landing shad in New Jersey is expected to continue to decrease as the current fishers age out of the fishery and interest in the fishery itself continues to decline.

Landings: Harvest of American shad by region in New Jersey has seen a shift from historically being a predominantly Lower Bay fishery (below Gandys Beach) to an Upper Bay/River fishery and a significant decrease due lack of effort and fisher participation. From 1985 through 2000, landings in the Lower Bay averaged 81,013 pounds, while the Upper Bay/River fishery saw average landings of 18,759 pounds of shad. From 2001 through 2016 this trend reversed with Lower Bay landings averaging 11,558 pounds and the Upper Bay/River fishery landing an average of 35,358 pounds of shad. Since 2017 the landings have been relatively evenly split with the Lower Bay averaging 5,612 pounds and the Upper Bay/River fishery averaging 5,160 pounds of shad landed (Figure 16).

Fishing Effort: Effort data for New Jersey's commercial fishery is estimated from CPUE presented in pounds per square foot of netting (Table 3). Overall effort in New Jersey has decreased more than 50 percent since 2005.

Biological Data: Length frequency data (fork length) were collected from American shad caught during fishery independent tagging operations by gill net in lower Delaware Bay (i.e., Reed's Beach, RM 14.8). However, data are comparable to the commercial fishery since similar gill net mesh sizes are used for this program. Fork lengths ranged from 346 mm to 615 mm and have fluctuated without trend over the course of the time series (Table 4). Sex ratios show the fishery is mostly prosecuted for females, with both the Upper Bay/River and Lower Bay fisheries averaging 80% female, but there are years when the percentage of males increased (i.e. 2010, Figure 17). The State of New Jersey obtains and will continue to obtain representative samples of the commercial catch to determine gender, size, and otolith samples for age estimation as required under the ASMFC FMP.

2.2.2.1.3 Delaware Commercial Fishery

Fishery Characterization and Regulations: The Delaware commercial American shad fishery in the Delaware River & Bay occurs during the spring spawning migration from late February through May. Landings are reported to the State of Delaware under a mandatory food fish license and are separated into two general areas of the bay, Upper or Lower Delaware Bay as delineated fisheries occurring above or below Bowers Beach, Delaware. Almost all shad landed are in conjunction with the concurrent striped bass commercial season that begins February 15 and extends through May 31 in the estuary. All landings are by gill net, both anchored (fixed)

and drifted. Anchor nets are used primarily in Delaware Bay; drift nets are used exclusively in the Delaware River by regulation (Table 5). There are no specific regulations that have been adopted to reduce or restrict commercial landings of American shad in the Delaware River & Bay. Regulations governing the striped bass fishery have the greatest impact on the total catch of American shad due to the presence of both species in the river and bay during the spring. Restrictions for the striped bass fishery include a limited entry license system, limitations on the amount and type of gear allowed to be fished, and gill net season and area restrictions. Specifically, these restrictions included no fixed gill nets in the Delaware River north of the southern shore of the Appoquinimink River from January 1 through May 31, and not more than 200' of fixed, anchored, or staked gill net from May 10 through September in the rest of the Delaware Estuary.

Fishery Participation: Delaware has a limited entry license system for the commercial gill net fishery under their food fishing equipment permitting regulations. There is a cap of 119 gill net permits, and no new permits will be issued. Fishers may choose not to renew their permit annually, so the total number actually obtaining a permit will change annually. Fishery participation has been decreasing for multiple years and this trend is expected to continue (Table 6). Many fishers do not land any American shad and many do not fish at all since they were allowed to transfer their individual striped bass quota to other licensed fishers. Furthermore, permits may be passed onto direct descendants or issued to a resident who has completed a commercial fishing apprenticeship program.

Landings: Beginning in 1985, the State of Delaware required mandatory reporting of commercial landings under the provisions enacted by the Delaware General Assembly in 1984. Every fisherman holding a commercial food-fishing license was required to submit a monthly report specifying where he fished, the type and amount of fishing gear deployed, and the pounds landed of each species taken for each day fished. Commercial landings of American shad in Delaware occur in the concurrent striped bass fishery.

Harvest of American shad by region in Delaware was not reported until 2002. Since 2002 landings in the Upper Bay/River have averaged 24,082 pounds while the Lower Bay landings averaged 9,176 pounds annually (Figure 18).

Fishing Effort: Since 1985, the data on catch, landings, and effort have been collected via logbooks. However, commercial harvesters are only required to report mesh size when landing striped bass. Commercial fishing effort for Delaware is measured using net yards. Net-yards were the yards of net fished on that day the landings occurred. The overall State of Delaware CPUE was high from 1985-1988 and then has been at a consistently less than 0.5 pounds per net yard fish since 1989, with the exception of an increase in CPUE in 2014 (Figure 19). Shad is no longer the target species of the spring gill net fishery. Few shad are harvested in the fishery since the larger mesh sizes used for striped bass allow escapement. To emphasize the decline of effort on American shad within the Delaware Estuary, the Co-op examined effort data from

the State of Delaware, expressed in yards of net fished, from 2003 to 2019 (Figure 20). Effort has generally decreased throughout the time series with effort peaking in the upper bay and river fishery in 2005 and the lower bay fishery in 2007.

Biological Data: Biological data collected by the State of Delaware were gathered from Delaware and New Jersey commercial fisher's landing catches from Delaware Bay. The State of Delaware collects information on length (mm), weight (lbs), and sex from the commercial fisher's landings (Table 7). Scale samples have been collected from these landings, but have not yet been processed for age estimation.

2.2.2.1.4 Determining Exploitation of the Delaware River American Shad Stock

Recent combined commercial landings (1985–2020) from the Upper Delaware Bay and River and Lower Delaware Bay are shown in Figure 21. State landings are considered reliable following the implementation of mandatory reporting in 1985 in Delaware and 2000 in New Jersey. Combined landings for Delaware and New Jersey have declined from a peak of 637,968 pounds in 1990 to a low of 704 pounds in 2020. Landings have been relatively low since 2010, with a peak in 2014 of 128,172 pounds (Figure 21). The main causative factors for the lower landings in the past decade in Delaware include regulatory action (limited entry), attrition in the fisheries, and reportedly low market value of shad, based on Delaware ex-vessel reports ($/lb = 0.75 in 2020; Figure 22), increased mesh size (7" stretch mesh) preferred by Delaware gill netters targeting larger striped bass, and increased abundance of striped bass. Average American shad landings in New Jersey continue to decline as fisherman age out of the fishery and the market for shad continues to wane. The yearly effort and number of fishermen landing American shad from the Delaware Bay New Jersey has declined significantly since the closure of the ocean intercept fishery in 2005.

New Jersey gill netters who target shad express concern that their nets catch striped bass in high numbers, yet they are not allowed to land bass; the bass damage their nets and they cut their hands on the spines and gill cover edges, so no additional effort resulting in increased landings is expected in New Jersey. Delaware gill netters report that any attempts to target shad catch large numbers of bass, and if they have already filled their striped bass quota, they cannot land additional striped bass and many will cease fishing. The overall decrease in coastal stocks of American shad may be an additional factor to the decrease in landings of shad.

Based on the 2020 Stock Assessment on American shad completed by the Atlantic States Marine Fisheries Commission, the adult total mortality rate of the Delaware River stock is considered unsustainable and there are conflicting trends (no trend and increasing trend) in adult abundance indices.

The Co-op used a ratio of commercial harvest to the geometric mean (GM) of female shad CPUE at Smithfield Beach (landings/GM, scaled by 100) from 1996-2019 to track how landings of the

Delaware River stock are reflected in the upstream adult abundance surveys each year. Total landings of the Delaware River stock were calculated using 50% of the entire commercial landings for each state (see section 2.2.2.1.5 for additional information on determining the proportion and location of Delaware River stock versus mixed coastal stock in the fishery).

A comparison of the landings to gill net GMs of female shad CPUE at Smithfield Beach shows a similar trend between the fishery and a measure of escapement from the upper Delaware until 2009, when lower harvest equated with higher GMs at Smithfield Beach (Figure 23). The ratio of commercial harvest/GM from Smithfield Beach ranged from 389 to 3,161 from 1996-2009 and was in a generally declining trend (Figure 24). From 2010-2019, the ratio ranged from 101 to 944 and remained relatively unchanged during that time period with the exception of an increase in 2014 as a result of high shad commercial landings that year.

2.2.2.1.5 Commercial Landings on Mixed Stock Fisheries

American shad occurring in the Delaware Basin are represented by both Delaware River origin fish as well as fish from multiple other coastal river stocks. The commercial fisheries operating within the Delaware Bay and lower Delaware River of Delaware and New Jersey land shad from the Delaware River stock as well as other coastal stocks and that the fishery directly impacts other coastal shad populations. To determine the proportion that other coastal river stocks are represented in the Delaware Basin landings, tag recaptures and recent genetics studies were considered.

The NJDFW initiated an American shad tagging program in 1995 in Delaware Bay as part of a cooperative interstate tagging program between New York and New Jersey. Tagging was conducted at Reed's Beach located in Cape May County, approximately 10 to 15 miles from ocean waters (Figure 25). This program uses drifting gill nets of 5.5-in to 6-in stretch mesh during March through May of each year. In the program, 4,508 American shad were tagged from 1995 to 2020 (Table 8). In recent years sampling yielded few American shad, with fewer than 100 shad tagged annually in the past 15 years. Through 2020, there have been 251 American shad returns reported (5.6% of tagged fish). The tag return data indicate that 60% of shad tagged this portion of Delaware Bay are recaptured outside of the Delaware Basin. Reported recaptures ranged from the Santee River in South Carolina to the St. Lawrence River near Quebec, Canada with the majority of non-Delaware Basin reports coming from Hudson, and Connecticut Rivers (Table 9).

A separate study using genetic analysis of microsatellite nuclear DNA was conducted in 2009 and 2010 to determine American shad stock composition (Waldman *et al*. 2014). Although samples were collected in 2009, they were only evaluated for a two-stock composition (Delaware/Hudson) and results were not comparable to the author's 2010 analysis or the more recent collections and analysis by U.S. Fish and Wildlife Service (USFWS), therefore the 2009 data were not considered in the development of this plan. For 2010, stock composition was

determined from American shad collected in Maurice Cove, NJ (RM 21, n = 31) and off Big Stone Beach, DE (n=191, RM 14; Figure 25). Stock composition estimates for 33 baseline populations indicated that 76% of the sampled fish in this study were of non-Delaware River origin (Table 10).

In 2017, the USFWS, in cooperation with Co-op members began collecting tissue samples from American shad caught in the commercial fishery and Co-op member's fishery-independent sampling in the Delaware River Basin to determine stock origin from 2017-2020 (Bartron and Prasko 2021). Genetic analysis was similar to the work reported in Waldman et al. 2014. A total of 14 baseline populations were evaluated from Maine to South Carolina as well as three locations in the Delaware River (Smithfield Beach, Lambertville, and Schuylkill River) and four regions covering the geographic range of the commercial fishery in lower Delaware River and Delaware Bay. These regions were delineated by Lower Bay (south of a line from Bowers Beach, DE to Egg Island Point, NJ), Mid-Bay (south of a line from Port Mahon, DE to Gandys Beach, NJ), Upper Bay (south of a line Collins Beach, DE to Mad Horse Creek, NJ), and Delaware River (all locations north of the Upper Bay region; Figure 25). In the Delaware River samples (n=368), there was some degree of other coastal stocks being represented (30%-42%, Table 11). These assignments were lower than samples collected from the commercial fishery in the lower River and Delaware Bay (Table 11). A total of 584 samples were collected between the four regions of the commercial fishery over the 4-year study. The proportion of fish assigned to a non-Delaware River stock in the fishery from the lower River and Bay ranged from 48% to 54% across the four geographic regions (Table 11).

The 2012 Sustainable Fishing Plan (SFP) acknowledged the occurrence of fish from other coastal shad stocks in the Delaware Bay harvest. At the time, it was assumed that only fish from the lower Bay had some representation from other coastal stocks, and a demarcation line was drawn across the Bay from the Leipsic River, DE (RM 34) to Gandys Beach, NJ (RM 30), as adopted from the ASMFC 2007 American Shad Stock Assessment, to represent the uppermost extent of which other coastal stocks ascended into Delaware Bay. This demarcation line was derived based on mark-recapture data from the NJDFW tagging program and formed the basis for assigning (i.e., as a proportion) the commercial harvest in the lower Bay to the Delaware River stock. For harvest that occurred in the Bay north of the demarcation line, 100% was considered Delaware River stock. For harvest south of the demarcation line, 39% of harvest was assigned to the Delaware River stock, and the remainder was assigned as mixed stock origin shad.

For the 2017 SFP, the demarcation point on the Delaware shoreline was changed to better reflect how landings are reported in that state and updated tagging data and genetics results from Waldman et al. (2014) were also considered. The demarcation line in the 2017 SFP extended from Gandys Beach, NJ to Bowers Beach, DE (RM 23). Using the recapture proportion from the NJDFW tagging studies, all landings north of the updated demarcation line were considered 100% Delaware River stock. South of the demarcation line, 40% of landings were be

assigned to the Delaware River stock and the remaining 60% of landings assigned to the mixed stock.

During the development of the 2017 SFP, there was an acknowledgement by the Co-op that additional genetic studies were necessary to evaluate the geographic extent to which the mixed stock was being exploited in the commercial fishery of the Delaware Bay and lower Delaware River in Delaware and New Jersey. In particular, there were uncertainties to the degree to which the mixed stock was exploited in the mid-Bay, upper Bay and lower Delaware River. In the USFWS study (Bartron and Prasko 2021) that sampled all four regions where the commercial fishery is executed, the proportion of the landings that were composed of non-Delaware (mixed stock) origin was similar across all regions, representing about half (50%) of all landings in the Delaware Bay and lower Delaware River. This new study suggests that the entire commercial fishery exploits shad from the mixed stock and of relatively equal proportion across the geographic range of the fishery. This study also suggests that there is not a clear demarcation line in the Delaware Bay to discriminate landings for assigning to the Delaware River stock versus other coastal stocks (mixed stocks). This was the first study to evaluate stock origin from the commercial fishery upstream from the lower Delaware Bay and provides evidence that previous demarcation lines in the Delaware Bay are not appropriate when describing the geographic extent of the impacts of the existing commercial fishery on shad of mixed stock origin. For this reason, the Co-op is recommending removal of any in-basin demarcation lines for the commercial fishery in Delaware and New Jersey.

The Co-op is sensitive to the potential impacts on East Coast shad stocks from the commercial fishery in the Delaware Bay and lower Delaware River. With the improved data available for the development of the 2022 SFP, the Co-op is modifying its assignment procedure for proportioning landings to the mixed stock. Moving forward, 50% of all commercial landings in Delaware and New Jersey from the Delaware Bay and lower Delaware River will be assigned to the mixed stock fishery.

The 2012 SFP did not have a mechanism to limit expansion of the Delaware Bay fisheries on the mixed stocks, but recommended that the feasibility for directly managing the mixed stock harvest be considered in the 2017 SFP. In the 2017 SFP, the Co-op established a benchmark that explicitly managed the harvest on the mixed stock. The benchmark was based on the total pounds landed from the mixed stock, which consists of 60% of the landings south of the demarcation line from Bowers Beach, DE to Gandys Beach, NJ. The benchmark was defined as the 75th percentile of landings from 1985-2015 where 25% of values are higher (47,650 lbs.). The benchmark was updated for 2022 SFP to reflect more recent genetics information (see section 3.1.6).

The Co-op will continue to annually monitor landings in the Delaware Bay to ensure any significant increase in harvest results in increased regulatory control for keeping exploitation at

current levels. Overall, mixed stock landings have been declining since mandatory reporting was enacted by both the States of Delaware and New Jersey (Figure 26).

2.2.2.2 Recreational Fisheries

The recreational fishery for American shad generally occurs from late March through June of each year. The fishery is concentrated in the non-tidal reach from Trenton, New Jersey (RM 133) to Hancock, New York (RM 330). Brandywine Creek supports the only notable recreational American shad fishery in Delaware's portion of the Delaware Estuary. It is a modest fishery that primarily occurs at the first blockage encountered upstream.

Historical participation in the recreational shad fishery has fluctuated but overall, angler effort has declined. Numerous creel surveys have been conducted since the 1960's using various sampling methodology (Marshall 1971; Lupine *et al*. 1980, 1981; Hoopes *et al.* 1983; Miller and Lupine 1987, 1996; NJDFW 1993, 2001; Volstad e*t al.* 2003). Estimates of angler catch and harvest in 2002 (Volstad 2003) were substantially lower than reported by Miller and Lupine (1987, 1996), representing a decline of total catch by 63% and 42% since those surveys in 1986 and 1995, respectively. Similarly, the percent of harvested shad declined from 1986 (49%) to 1995 (20%) and was estimated at 19% in the 2002 survey. Angler catch rates (shad/hr), also varied among the three surveys (0.19 shad/hr, 0.25 shad/hr, 0.13 shad/hr in 1986, 1995, and 2002, respectively) with the lowest catch rate observed during the 2002 study. Inclusion of only those anglers specifically targeting American shad during the 2002 survey however, substantially improved angler catch rate (non-tidal: 0.34 shad/hr; Volstad *et al*. 2003). No comprehensive creel survey of the Delaware River has been accomplished since 2002.

The Marine Recreational Information Program (MRIP) provides characterization of recreational American shad harvest in the Delaware Estuary & Bay. Catch estimates are inconsistent among years and highly imprecise (Table 12). The excessively high (> 50%) percent standard error estimates (PSE) suggest total numbers of shad harvested by recreational anglers are unreliable. Co-op members agree anglers nominally fish for American shad in the Delaware Estuary and Bay; yet, also agree the MRIP data are not representative of any shad harvest in the Delaware Estuary and Bay.

The PFBC, in collaboration with the NPS - Upper Delaware Scenic & Recreational River (UPDE), jointly promoted a voluntary angler diary program (2001–2016) for reporting recreational angler catch (Lorantas and Myers 2003, 2005, 2007; Lorantas *et al*. 2004; Pierce and Myers 2007; Pierce and Myers 2014; NPS unpublished data). The diary program was considered unrepresentative of the Delaware River recreational shad fishery. Essentially, only the licensed guides by UPDE, routinely reported trip/catch information, who were more focused on the tailwater trout fishery than shad. Furthermore, in most years, no information was available from participating anglers in downriver reaches (RM 133–303) below the UPDE, where the recreational shad fishery is principally focused.

The Delaware River Shad Fisherman's Association (DRSFA) represents the single largest club specifically focused on the Delaware River American shad. It is unknown the extent that DRSFA members release or harvest shad catches. The DRSFA also promotes an angler log, but these records have not been made available to Co-op members. Statements concerning American shad restoration and conservation are described on DRSFA's website (https://www.drsfa.org/).

Historically, annual shad tournaments within the Delaware River have been organized by various enthusiasts and clubs over the past several decades. Permitting and catch reporting by tournament organizers is required by the basin states; yet, available information regarding shad tournaments is inconsistent. Present-day, tournament shad fishing is best represented by the annual Bi-state Shad Fishing Contest, launched in 2011. This tournament draws exceptional angler participation offering large monetary prize rewards among various categories. Participating anglers in the Bi-state tournament typically focus shad fishing in the middle and lower reaches of the Delaware River. Other award-centric tournaments also occur during the springtime shad run, but generally tend towards fewer participants and remain localized to a specific reach.

Shad tournaments typically remain harvest-oriented for determining participant success (i.e., largest shad, etc.) and assignment of any accolades. Annual estimation of total harvest by tournament participation is unknown. Tournament organizers, however, generally maintain up-to-date on-line leaderboards, allowing participants to real-time check if caught shad can place; otherwise, anglers are able to catch-and-release shad, rather than culling harvested fish. Quantification of any reduction of overall tournament harvesting of shad related to this practice is unknown.

Recreational hooking mortality is assumed to be low in the Delaware River. A study by Millard *et al.* 2003 observed a 1.6% recreational hooking mortality of spawning American shad caught in the Hudson River after a five-day holding period. All mortality occurred for fish caught on or after May 6 when water temperatures increased to greater than 12^{o}C. No hooking mortality studies have been conducted in the Delaware River.

There is a critical need for routine comprehensive creel surveys characterizing the recreational American shad fishery in the Delaware River Basin. Potential future surveys need to focus principally on the non-tidal reaches. Since the MRIP program does not include non-tidal reaches, resulting data from that program poorly describes the Delaware River recreational shad fishery. Volstad e*t al.* (2003), represents the most recent comprehensive creel survey (i.e., 2002) accomplished in the non-tidal Delaware River reaches. This study was jointly supported by Co-op members, but funding was on an *ad hoc* basis. It is nearly 20 years out-of-date and likely does not represent present day shad angling behaviors. Alternative available creel data since Volstad *et al.* (2003) is of limited utility and inadequate to describe recreational use and harvest of American shad. Instead, anecdotal angler reports suggest the recreational shad

fishery persists principally as catch-and-release. Furthermore, the presumption tournament shad fishing is of minor consequence to the Delaware River shad population remains unsupported. The lack of reliable, routinely collected data on recreational use and harvest, precludes compilation of more robust stock assessments.

2.2.2.3 In-State Bycatch and Discards

There is little information on bycatch or discards of shad in any commercial fisheries within the Delaware Estuary; except in the Delaware Bay striped bass fishery, which is discussed in detail in Section 2.2.2.1.3. Otherwise, American shad has not been reported as bycatch from other commercial fisheries operating within the Delaware River Basin to either the States of New Jersey or Delaware. Neither state requires the reporting of discarded shad from any commercial fisheries within the Delaware River Basin; thus, no information is available.

2.3 Other Influences on Stock Abundance

In addition to harvest and natural mortality, other factors can also impact American shad populations. The Co-op has identified several such influences: (1) Delaware River flow management, (2) invasive species interactions, (3) potential effects from overfishing and ocean bycatch, (4) impacts of restoration stocking, (5) impingement and entrainment, and (6) habitat alteration.

2.3.1 Delaware River Flow Management

The Delaware River is an important source of drinking water, industrial water supply, power generation, and supports fishing and other recreational uses. The river also supports a diverse suite of aquatic life, including many fish species, such as American shad. Water flow is highly regulated in the Delaware River Basin and management is designed to support the many dependent users of the resource. Flow releases from the upper Basin, at the Cannonsville, Pepacton, and Neversink reservoirs, are managed by New York City as part of their city's water supply system, and releases are designed to achieve flow targets on the Delaware River at Montague. Hydroelectric projects, such as those in the Mongaup River and at Lake Wallenpaupack also influence river flows in the Delaware River and their respective tributaries. Other basin reservoirs, including Jadwin, Prompton, F.E. Walter, Beltzville, Blue Marsh, Nockamixon, Merrill Creek can also be used to help achieve flow targets in the Delaware River at Trenton, which help manage the location of the salt front in the estuary and provide flood control.

Flow management in the Delaware River Basin can have a direct impact on spawning success and juvenile survival of American shad as well as impact other aquatic species in the basin. A Flexible Flow Management Program (FFMP 2017) was developed to direct releases from the New York City reservoirs in the upper basin. The FFMP ensures that minimum releases occur at

each of the reservoirs, provides a mitigated step-down strategy when releases are directed to change dramatically to ensure areas of the river are not inadvertently dewatered, and also provides cold-water releases in the summer months to help protect the trout fishery in the upper basin. Releases from the hydroelectric facilities are also managed to support cold-water fisheries and help protect dewatering events in the respective tributaries as well as the main stem river. The Co-op will continue to work with the many different regulatory bodies in the Basin to ensure continued and improved water management strategies for American shad and other aquatic resources.

2.3.2 Invasive Species Interactions

Several aquatic invasive fish species are becoming more established in the Delaware River system that could have negative impacts on the American shad population. Northern snakehead (*Channa argus*), flathead catfish (*Pylodictis olivaris*), and blue catfish (*Ictalurus furcatus*) are larger predatory species that have been documented or could potentially prey on adult and juvenile American shad.

Northern snakehead were first reported from the Delaware River Basin in the Schuylkill River in 2004 and have recently spread as far as the New York portion of the watershed (https://nas.er.usgs.gov/queries/factsheet.aspx?speciesid=2265, last accessed September 22, 2021) Although large northern snakehead could potentially predate adult American shad, that has not been documented in the literature. Predation on juvenile shad has also not been documented, but is more likely to occur. Juvenile alewife and blueback herring have been documented in the gut contents of northern snakehead in Virginia rivers (Isel and Odenkirk 2019).

Flathead catfish were first documented in the Schuylkill River system, in the Blue Marsh Reservoir, as early as 1997 (https://nas.er.usgs.gov/viewer/omap.aspx?SpeciesID=750, last accessed September 22, 2021). The species is prevalent in the Schuylkill River system and has been reported from the main stem as far north as Narrowsburg Pool in New York. Flathead catfish have been known to prey on both juvenile and adult American shad and selectively target shad during the spring spawning migration (Pine et al. 2005, Schmitt et al. 2017).

Blue catfish, a more recent invader to the Delaware River Basin, were first reported from the Christina River in 2013 and are currently only found in the lower river. Blue catfish can reach a large size and are also known to prey on American shad, but likely not as selectively as flathead catfish (Schmitt et al. 2017)

2.3.3 Overfishing and Ocean Bycatch

Excessive losses to directed fishing and bycatch are often implicated as causative factors in fish stock declines. Directed commercial harvest occurs in spawning rivers on adults and until 2005,

in ocean waters. Recreational harvest of American shad generally occurs during spawning migrations. American shad taken while fishing for other species is called bycatch and it can occur in both rivers and the ocean.

Potential impacts of recent directed ocean harvest on American shad are more difficult to identify. Ocean harvest has been poorly quantified. Moreover, limited tagging data suggests that ocean harvest is made up of many Atlantic coast populations. Since the stock of origin is generally not known, it is very difficult to identify losses that are specific to the Delaware River stock. Some sense for relative losses on a coast-wide basis can be obtained from reported landings. The Delaware shad population appeared to decline most precipitously during the early 1990s. Mean annual harvest for states north of North Carolina during the first half of the 1990s was 1,148,893 lbs. per year from ocean waters and 413,510 lbs. from in river fisheries (ASMFC 2007). Reported annual ocean harvest of American shad from outside the 200 mile limit off of Mid-Atlantic and New England states was 310,000 lbs. (Northwest Atlantic Fisheries Organization http://www.nafo.int/about/frames/about.html catch statistics for ocean waters outside of the EEZ). Recent ASMFC shad assessments have drawn conflicting conclusions about impacts of this ocean harvest. ASMFC (1998) concluded that there was no evidence that the ocean harvest was affecting coast-wide stocks. ASMFC (2007) hypothesized that coastal harvest was affecting some stocks including that in the Delaware River. Amendment 1 to the Interstate Fishery Management Plan for Shad and River Herring (ASMFC 1999), began a phase-out of directed harvest of American shad in state coastal waters beginning in 2000. A total ban has been in effect by U.S. Atlantic coastal states since 2005.

2.3.3.1 Incidental Ocean Harvest

Quantification of the impact of bycatch and incidental fisheries on Delaware River American shad remains difficult. Two fishery management plans have identified alternatives to reduce catch of American shad in their Fishery Management Plans (FMP). The Mid Atlantic Fisheries Management Council's (MAFMC) Amendment 14 of the Atlantic Mackerel, Squid and Butterfish FMP (MAFMC 2014) and the New England Fishery Management Council's (NEFMC) Amendment 5 to the Atlantic Herring FMP (NEFMC 2014) both identified shad and river herring as incidental catch in these directed fisheries and acknowledged the need to minimize catch of shad and river herring. Both of these plans, through the amendments identified above and subsequent framework adjustments:

- Implemented more effective monitoring of river herring and shad catch at sea;
- Established catch caps for river herring and shad; and
- Identified catch triggers and closure areas.

The 2020 ASMFC Stock Assessment for American Shad (see section 4.1.4; ASMFC, 2020) provides a detailed assessment of incidental ocean catch following methods described in the most recent River Herring Stock Assessment (ASMFC 2017) which were developed for the FMPs

described above. The entire analysis is not presented here, but key results are summarized below:

- From 1989-2017, the total annual incidental catch of American shad ranged from 42 – 262 metric tons, averaging 64 metric tons since 2010.
- Catches of American shad were greater in New England than in the mid-Atlantic, though the contribution of each region varied among years.
- American shad catches occurred primarily in large-mesh gill nets, small-mesh bottom trawls and paired midwater trawls. The contribution of each gear type varied by year.
- The majority of catch in small-mesh bottom trawls and large-mesh gill nets is discarded. Most catch from midwater trawls is retained.
- The size distribution of observed American shad varied by gear.
    - Bottom trawl. Range: 10-77cm. Mode: 26cm.
    - Gill nets. Range: 14-76cm. Mode: 47cm.
    - Midwater trawl. Range: 13-51cm. Mode: 25cm.
- Catch estimates represent total catch (retained + discarded) of American shad in U.S. oceanic and state waters. Catch estimates can be attributed to a specific fishing fleet but cannot be attributed to a specific fishery because species managed through multiple fishery management plans are often caught on one fishing event.
- Stock determination of incidental catch has not been conducted.

2.3.4 Impacts of Restoration Stocking

The PFBC has been stocking otolith-marked American shad fry as part of their restoration program for the Delaware River Basin (Table 13). Eggs collected from Delaware River shad have been used in restoration efforts on other rivers, but since 2000, all Delaware River shad fry have been allocated to the Lehigh, and Schuylkill rivers. Occasionally, excess production was stocked back into the Delaware River at Smithfield Beach (2005 to 2008). Egg-take operations on the Delaware River have resulted in the use of an average of 741 adult shad brood fish per year (1996–2019). Eggs from these shad are fertilized and transported to the PFBC's Van Dyke Anadromous Research Station where they are hatched, otolith-marked and stocked in areas above dams where fish passage projects are in place.

The contribution of hatchery-reared fry to the returning population was estimated by interpretation of oxytetracycline daily tagging patterns within the otolith microstructure (Hendricks *et al*. 1991). The total hatchery contribution at Smithfield Beach was low ranging from 0.0 to 7.8% (Table 14), suggesting that hatchery-reared fry are not a significant component of the Smithfield Beach catch. The PFBC restoration program focuses shad fry stockings within the Lehigh and Schuylkill River main stems. Both the Lehigh River (RM 183) and Schuylkill River (RM 92) connect to the Delaware River main stem well downriver of Smithfield Beach (RM 218). Presumably hatchery-stocked shad are returning to their natal river of either tributary. The poor catches of marked shad at Smithfield Beach suggest straying is not a frequent occurrence.

Self-sustaining shad spawning runs in to the Lehigh and Schuylkill rivers originally envisioned (i.e., >100,000 fishes; PFBC 1988) have not materialized after 35 years of restoration efforts. It is the conclusion of PFBC that American shad passage into the Lehigh and Schuylkill rivers is insufficient and inadequate to achieve the original restoration goals. PFBC, in partnership with the Wildlands Conservancy and American Rivers/NOAA Community Grant Program, supported a feasibility study to investigate a suite of engineering options on the Lehigh River. Study findings suggested improvements of shad passage were best accomplished by full dam removal of the Easton and/or Chain dams (KCI Technologies Inc. 2013). To date, the owners have not expressed interest in pursuing dam removal. Yet without annual maintenance fry shad stockings, any future spawning runs into either tributary would most likely be nominal. The PFBC will continue annual shad fry stockings to maintain *status quo* of present-day spawning runs. Yet, Co-op members will continue to investigate alternatives for returning shad to historical spawning ranges.

2.3.5 Impingement and Entrainment

Power generating facilities, refineries, and other industries rely on withdrawal of surface water from the Delaware River and tributaries to cool their industrial processes, with most industrial water withdrawals requiring continuous once-through use of water. This withdrawal results in fish and other aquatic organisms either becoming trapped against the intake screens (impingement) or taken further into the cooling system (entrainment). Both impingement and entrainment can result in the death of fish and other organisms. When fish spawn in spring and early summer in the Delaware River, the resulting eggs and larvae are vulnerable to entrainment; as fish grow larger during the balance of the year, they become susceptible to impingement. Therefore, losses to impingement and entrainment are ongoing throughout the calendar year.

There are several large water intake systems at energy projects on in the Delaware River Basin. In recent years, some coal-fired plants have closed or been converted to more efficient energy generating stations. Although impingement and entrainment impacts to fish populations, including American shad, are thought to be significant at the remaining facilities, additional assessment of current operations and impacts need to be evaluated for intake systems in the Basin.

2.3.6 Habitat Alteration

Although American shad and other migratory fish have access to the entire main stem river and far up into its headwaters, issues with water quality and access to spawning and nursery habitat in the tributaries are still being addressed. Dam construction and pollution starting in the 1800s had a significant impact on the shad population in the Delaware Basin. Although main stem dams no longer exist and significant water quality improvements have occurred since the

1940s, habitat alteration continues to influence American shad populations. Over 1,500 dams still exist in the Delaware River Basin that preclude access to spawning and nursery habitat for American shad (DRBFWMC 2021). The Nature Conservancy has recently released a report to prioritize dams for removal or fish passage to benefit American shad and river herring in the Delaware River Basin (DeSalvo et al. 2022). Dam removals have occurred in the Basin and are several more are planned in the near future, improving access to historic habitats.

American eel weirs are still operational in the upper Delaware River Basin and can impact upstream and downstream migration of American shad. The impact to migration is thought to be minimal, but historically, it was recognized that the downstream traps on the eel weirs may cause mortality on juvenile American shad migrating downstream.

The Delaware River watershed spans nearly 13,000 square miles in the mid-Atlantic region and the Delaware River and tributaries provide drinking water to over 5% of the U.S. population. The watershed has a range of habitats ranging from heavily forested areas to highly urbanized areas. The landscape in the watershed has changed through time, with a 10% increase in developed land and decrease of 2% for forested land from the period of 1996-2010 (PDE 2017). The loss of forested habitat and increase in development likely has impacts on the water quality and water quantity in the Delaware River basin and may impact on American shad reproduction and juvenile survival, although those impacts have not been quantified.

3. Sustainable Fishery Benchmarks and Management Actions

The Co-op proposes a series of relative indices for monitoring trends in the American shad population in the Delaware River Basin. The benchmarks were derived to allow the existing fishery to continue. The benchmarks have been set to respond to any potential decline in stock. Thus all benchmarks are viewed as conservative measures. The benchmark measures for maintaining sustainability are in order of their importance as follows:

1. Female Total Mortality
2. Non-tidal juvenile abundance index (JAI)
3. Tidal juvenile abundance index (JAI)
4. Smithfield Beach female adult catch-per-unit-effort (CPUE) survey
5. Commercial harvest to Smithfield Beach relative abundance ratio
6. Mixed stock landings

3.1 Benchmarks

3.1.1 Female Total Mortality

One of the objectives of Amendment 3 to the Interstate Fishery Management Plan for Shad and River Herring (ASMFC 2010) is to maintain total mortality of stocks at or below stock

assessment benchmarks. The female total mortality Z_{40} benchmark developed for the Delaware River in the 2020 assessment is 1.07 (ASMFC 2020). The three-year average female Z estimate from otoliths in 2017 (1.3) was above the benchmark (1.07), therefore; mortality was determined to be unsustainable. Due to data limitations in 2018, the current three-year average Z is unavailable for this update, however; annual Z estimates since the completion of the assessment indicate a continued need to reduce mortality (Table 15, Figure 12).

3.1.2 Non-tidal JAI index

This JAI is based on annual catch data standardized by environmental covariates using GLM methodology. Only data originating from Phillipsburg, Delaware Water Gap, and Milford Beach are included in the JAI. The benchmark was based on data from years 1988-2019 (Table 16, Figure 27). Failure is defined as the occurrence of three out of five years where JAI values are below the 50th percentile from the reference period (188). Exceeding the benchmark will trigger management action. The period of 1988 to 2019 was selected as these years encompass the years when sampling methodology was consistently applied to all sampling stations included in the JAI calculations; however, no sampling occurred at any non-tidal station between 2008 and 2011 and in 2018. The non-tidal JAI fell below the benchmark most recently between 2013 and 2016.

3.1.3 Tidal JAI index

This JAI is based on annual geometric means of the catch data from stations near Trenton to Delaware Memorial Bridge. The benchmark was based on data from years 1987-2019 (Table 17, Figure 28). Failure is defined as the occurrence of three out of five years where JAI values are below the 50th percentile of the reference period (5.81). Exceeding the benchmark will trigger management action. The period of 1987 to 2019 was selected as these encompass the years when sampling methodology was consistent among stations. The tidal JAI fell below the benchmark most recently in 2012, 2016, and 2019.

3.1.4 Smithfield Beach CPUE Index

This index is based on the annual GM of the CPUE (shad/net-ft-hr) of female shad in the PFBC egg-collection effort at Smithfield Beach and represents the data series where sex information was available from 1996 through 2019 (Table 18, Figure 29). This index represents a fishery-independent measure of the spawning run success as survivors after the fishery. Failure is defined as the occurrence of three out of five years where GM values are below the 50th percentile of the reference period (0.52). Exceeding the benchmark will trigger management action. The GM fell below the benchmark most recently in 2010, 2016, and 2019.

3.1.5 Ratio of Commercial Harvest to Smithfield Beach Relative Abundance Index

This index is defined as the ratio of the total Delaware River stock landed by commercial fishers as reported to the States of New Jersey and Delaware divided by the survivors after the fishery as indexed by the Smithfield Beach gill net female shad GM divided by 100. It is based on data from 1996-2019 (Table 19, Figure 30). Failure is defined as the occurrence of three out of five years where ratio values are higher than the 50th percentile of the reference period (799). Exceeding the benchmark will trigger management action. The ratio estimate exceeded the benchmark most recently in 2014.

3.1.6 Mixed Stock Landings

This index is defined as the total pounds landed from the mixed stock, which consists of 50% of combined commercial landings from Delaware and New Jersey. The index was based on data from 1985-2019 (Table 20, Figure 31). The benchmark is defined as the 25th percentile of the time-series where 75% of values are higher. Failure is defined as the occurrence of 2 consecutive years above a value of 18,505 pounds. Exceeding the benchmark will trigger management action. This index provides additional harvest protections for American shad stocks with origins outside of the Delaware River, some of which have closed commercial fisheries. The pounds landed on the mixed stock has exceeded the benchmark most recently in 2013 and 2014.

3.2 Benchmark Summary

Index	2022 Benchmark Value	Years of Index for Benchmark	Benchmark Level	Management Trigger	Benchmark Change from 2017
Female Total Mortality	1.07	1996-2019	$Z_{40\%}$	Three year rolling average above benchmark	This is a new Benchmark
Non-Tidal JAI (GLM)	188*	1988-2019	50th percentile	3 out of 5 years below benchmark	Benchmark previously was ~145.9, raised from 25th to 50th percentile, management trigger changed from 3 consecutive years, data from 2015-2019 added
Tidal JAI (GM)	5.81	1987-2019	50th percentile	3 out of 5 years below benchmark	Benchmark previously was 4.00, raised from 25th to 50th percentile, management trigger changed from 3 consecutive years, data from 2015-2019 added
Smithfield Beach Female CPUE (GM) Index	0.52	1996-2019	50th percentile	3 out of 5 years below benchmark	Benchmark previously was 37.5, raised from 25th to 50th percentile, management trigger changed from 3 consecutive years, females only considered, data from 2015-2019 added
Ratio of Comm. Harvest to Smithfield Beach	799	1996-2019	50th percentile	3 out of 5 years above benchmark	Benchmark was previously 36.5, delineation and proportion of Delaware River Stock harvest changed (see Mixed Stock Landings), lowered from 85th to 50th percentile, management trigger changed from 3 consecutive years, data from 2015-2019 added
Mixed Stock Landings	18,505	1985-2019	25th percentile	2 consecutive years above benchmark	Benchmark was previously 47,650 lbs, lowered from 75th to 25th percentile, demarcation line removed, proportion assigned to mixed stock is 50% of all landings, data from 2015-2019 added

*This value may change slightly each year based on re-analysis of data using the GLM.

3.3 Management Actions

There are many restrictions already in place for the commercial fishery that limit participation. These include limited entry, seasons, and gear restrictions throughout the Delaware Bay. During the implementation of the 2017 SFP, indices for the fishery benchmarks were not exceeded for the specified time periods, therefore no management action was taken in response to benchmark exceedance in the 2017 SFP. In response to the mortality benchmark exceedance as identified in the 2020 Stock Assessment, the Co-op will be implementing measures to reduce landings in both the commercial and recreational fisheries.

Immediate action will be taken to reduce shad landings by approximately 33% in the commercial fisheries of Delaware and New Jersey. Delaware will require a minimum monofilament diameter size of 0.52 mm for all anchored gillnets with stretch mesh of four inches or larger. Delaware will also implement a landings cap of 7,772 pounds annually, which if exceeded, will require management action as directed by the Co-op Policy Committee the following season. Delaware also plans to implement more detailed reporting on gear and fishing location and conduct on-board sampling of the fishery. New Jersey will be implementing an annual quota of 17,251 pounds that will be tracked weekly the first year following exceedance, and will allow for in-season closure of the fishery once the quota is achieved. Any quota exceedance will be deducted pound-for-pound from the following season's quota.

Immediate action will be taken to reduce recreational landings by reducing the creel limit for American shad from three to two fish per day, basin-wide. Within the Lehigh and Schuylkill (above I-95 bridge) rivers, the American shad fishery will remain as catch-and-release.

The Co-op will review the benchmarks of the SFP annually and if benchmark(s) are exceeded, the Policy Committee will meet and recommend specific management action to be taken immediately that is commensurate with the level of benchmark(s) exceedance from the list below:

Commercial Fishery:

- Reduce commercial fishery landings through implementing one or more of the following:
    - gear restrictions
    - area restrictions
    - seasonal restrictions
    - escapement periods
    - trip limits
    - quota with in-season closure in Delaware
    - reduced quotas in Delaware and New Jersey
- Closure of the commercial fishery
- Other measures to be determined

Recreational Fishery:

- Reduce recreational fishery landings through implementing one or more of the following:
    - creel limit reduction to 1 fish per day
    - recreational catch and release only
    - seasonal closures
    - area closures
    - gear restrictions
- Closure of the recreational fishery
- Other measures to be determined

4. Proposed Time Frame for Implementation

The Co-op proposes that this plan be re-evaluated on a five-year cycle. The tenure for the 2022 SFP is expected to cover the period 2022 through 2026. Thereafter the next planned update should be initiated in 2025. All datasets, with the exception of the mortality benchmark, will be updated annually for assessing the exceeding of any benchmarks requiring immediate management action.

The Co-op views the 2022 SFP as a working document. Over the tenure of the 2022 SFP, Co-op members will continue investigations of recommended actions herein and/or as new opportunities become available. Petitions arising to ASMFC for updating the 2022 SFP may be initiated prior 2025.

5. Future Monitoring Programs

5.1 Fishery Independent

5.1.1 Juvenile Abundance Indices

The tidal beach seine program conducted by NJDFW will continue indefinitely, given its importance to their striped bass monitoring requirements.

The non-tidal seine program will continue through a collaborative effort during the duration of this SFP (2022-2026). The index will be generated from catches from Phillipsburg, Water Gap, and Milford. The inclusion of Trenton and the upper freshwater sites in the East Branch to the index will be reevaluated for the next SFP update. The continuance of this program is dependent on the collaboration among Co-op members ability to commit personnel resources without dedicated budgeted funding.

5.1.2 Adult Stock Monitoring

Spawning stock
The PFBC will continue to fully support the fishery independent survey at Smithfield Beach (gill net survey) for the next five years (2022-2026). The objective is to obtain biological data on the spawning stock as well as an index of relative abundance. Additionally, all caught shad will be strip spawned in support of the PFBC American shad restoration program for the Lehigh and Schuylkill rivers.

Hatchery evaluation
Otoliths of all hatchery-reared American shad larvae stocked by PFBC into the Delaware River Basin are marked with oxytetracycline to distinguish hatchery-reared shad from wild, naturally-produced shad (Hendricks *et al*. 1991). Since 1987, larvae were marked with unique tagging patterns accomplished by multiple marks produced by immersions 3 or 4 days apart. Determinations of origin are interpreted from the presence of florescent tagging patterns in the otolith microstructure. Hatchery contribution is determined for specimens collected in the Schuylkill and Lehigh rivers above the first dam and in the Delaware River at Smithfield Beach. The proportion of hatchery fish present in juvenile or adult population will continue to be monitored as per ASMFC Amendment 3.

5.2 Fishery Dependent

5.2.1 Commercial Fishery

The States of Delaware and New Jersey will conduct fishery dependent surveys as required by ASMFC Amendment 3. Landings will be reported monthly to allow for timely tracking of harvest each year.

5.2.2 Recreational Fishery

A comprehensive angler use and harvest survey on the Delaware River is cost prohibitive due to the extensive area to be covered. The Co-op will attempt to pursue financial support for a comprehensive creel survey in order to better document angler use and harvest in the Basin. Monitoring recreational landings, catch and effort is mandated by ASMFC in Amendment 3.

6. Fishery Management Program

6.1 Commercial Fishery

Delaware: The State of Delaware has no regulations that have been specifically adopted to reduce or restrict the landings of American shad in the Delaware Estuary. However, there will be a monofilament size restriction for anchored gillnets and a landings cap to be implemented

by the 2023 fishing season and there are general regulations that apply to the commercial fishery that limit commercial fishing. Existing regulations affecting the striped bass fishery will remain the same, such as limited entry, limitations on the amount of gear and annual mandatory commercial catch reports. Area and gear restrictions, with the inclusion of the increased monofilament diameter with this SFP, will otherwise remain unchanged (see Section 2.2.2.1.3).

New Jersey: New Jersey waters are open to gill netting for the majority of the year but the current directed commercial fishery for American shad occurs primarily during March through April of each year depending on environmental conditions. New Jersey regulations are listed in Table 1. Limited entry is in place; permits are not gear specific. All permits are currently non-transferable except to immediate family members. New Jersey will be implementing a quota for commercial American shad landings during the implementation of this SFP that will be effective for the 2023 fishing season.

Pennsylvania and New York: Both Pennsylvania and New York do not permit the commercial harvest of American shad within the Delaware River Basin.

6.2 Recreational Fishery

Within the jurisdictional waters of New Jersey, New York, and Pennsylvania for the Delaware River main stem, all currently impose a three shad daily possession limit with no size limit or closed season. Within the tidal portion of the Delaware River, Bay, and their tributaries, New Jersey imposes a six shad daily possession limit, with a maximum of three American shad, with no size limit or closed season. The State of Delaware continues with a ten fish/day, combined American and hickory shad, with no size limit or closed season. Little effort is expended by recreational anglers for American shad in Delaware waters with no reported harvest.

With the implementation of this SFP, recreational daily possession limits specifically for American shad will be reduced to two fish per day across all basin states by the 2023 fishing season.

The Lehigh and Schuylkill rivers represent the two largest tributaries to the Delaware River, draining 3,529.7 km^2 and 4,951.2 km^2, respectively. Both of these tributaries in their entirety are contained within Pennsylvania. Beginning January 1, 2013, regulations were modified to reflect recreational catch and release only and prohibited commercial harvest of American shad.

6.3 Bycatch and Discards

New Jersey and Delaware do not require mandatory reporting of bycatch and discards in their commercial fisheries. In the recreational fishery many anglers are practicing catch-and-release,

there are no plans to regulate this other than with possession limits which are already in place or are planned to be implemented.

7. Data Needs for the Delaware River American Shad Population

To some extent American shad remain an enigma for the Delaware River Basin as well as coast-wide. While current knowledge has provided insight into the returning adult spawning run, YOY production and recreational/commercial exploitation, we essentially have a very limited knowledge of landscape-scale and temporal variation of shad within the Basin similar to other basins along the Atlantic Coast.

To conduct a data rich stock assessment for American shad in the Delaware River Basin, additional data needs for improved stock assessment are described in the 2020 ASMFC American shad Stock Assessment (ASMFC 2020) and items specific to the Delaware River Basin listed in this section.

7.1 Conducting a Basin-wide Creel Survey

The recreational fishery has not been assessed by creel survey in the Delaware River Basin since 2002. An updated basin-wide creel survey is necessary to better understand the recreational fishery and its impact on stock status. Post-release mortality assessment for recreational catch and release fisheries is also a data need for improved stock assessment.

7.2 Determining Proportion of Mixed Stock Fishery

Tagging and genetics studies have indicated that some portion of the American shad captured in the Delaware Bay are spawning stock from other Atlantic Coast Rivers. Additional robust genetic or tagging studies within the entire expanse of the Bay will better evaluate the extent of mixed stock circulation in the Basin. In addition, better reporting of capture location for the Delaware River/Bay commercial harvest occurs is necessary to better characterize the impact of the fishery on the Delaware River stock as well as stock of other Atlantic Coast rivers.

7.3 Improving Ageing Techniques

Based on the recommendations from the 2020 Stock Assessment, otoliths are the preferred aging structure. Currently, the Delaware River Fish and Wildlife Cooperative Unit Aging Subcommittee (DRFWCUAS) is developing a new aging otolith aging protocol incorporating recommendations in the recent stock assessment.

7.4 Adding Fishery-Independent Monitoring Programs

Reliance of characterizing the adult shad spawning run singularly upon Smithfield Beach as representative of the entire Delaware River Basin is a poor assumption. Sampling on a larger geographic scale is needed to better characterize the variation of spawning adult population in the Basin. Returning spawning adult shad appear to be utilizing the upper Delaware Estuary reaches as spawning grounds, as water quality continues to improve. Without an adult monitoring program in the upper Delaware Estuary, validation of the tidal JAI will remain intangible.

7.5 Characterizing Loss from Non-traditional Fishery Harvest sources

Losses of shad from the Delaware River population beyond either recreational or commercial harvest occur. Additional assessment of impingement and entrainment from various water should be undertaken. Flow management regimes in the Basin should be reviewed to determine impacts to American shad reproduction and survival.

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9. Figures

Figure 1. The Delaware River watershed.

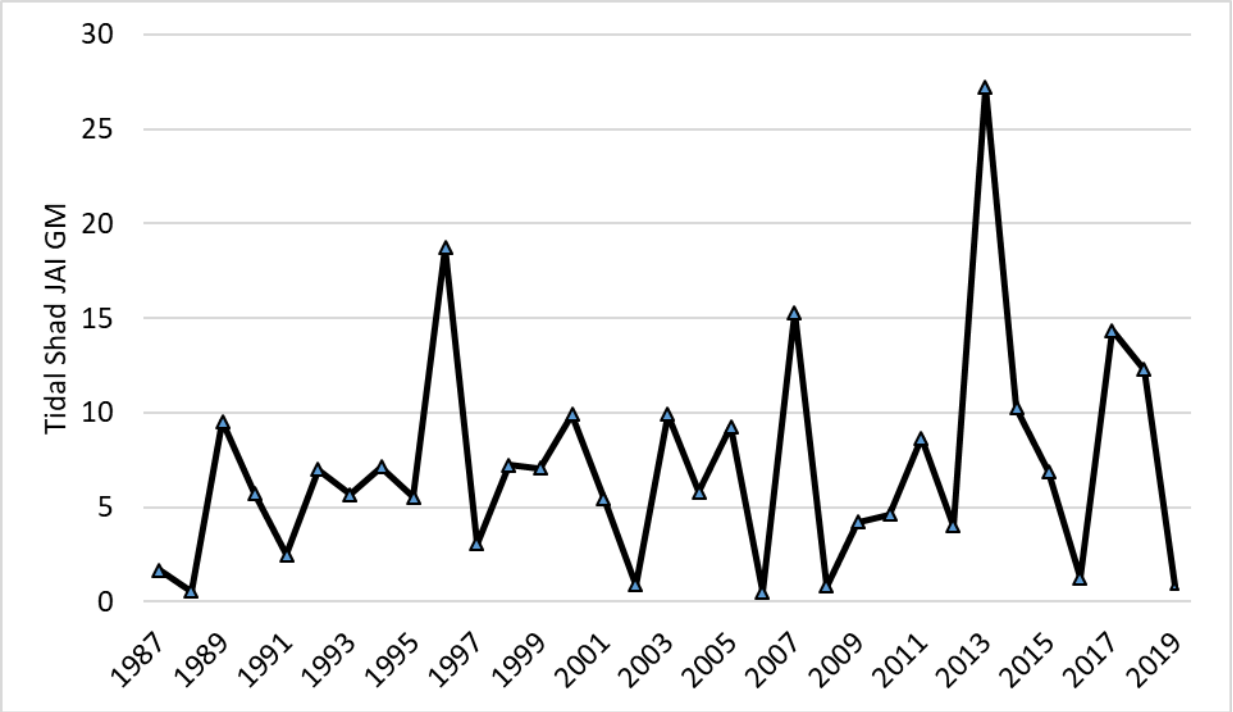

Figure 2. The geometric mean of the juvenile abundance index (JAI) for American shad in the tidal Delaware River.

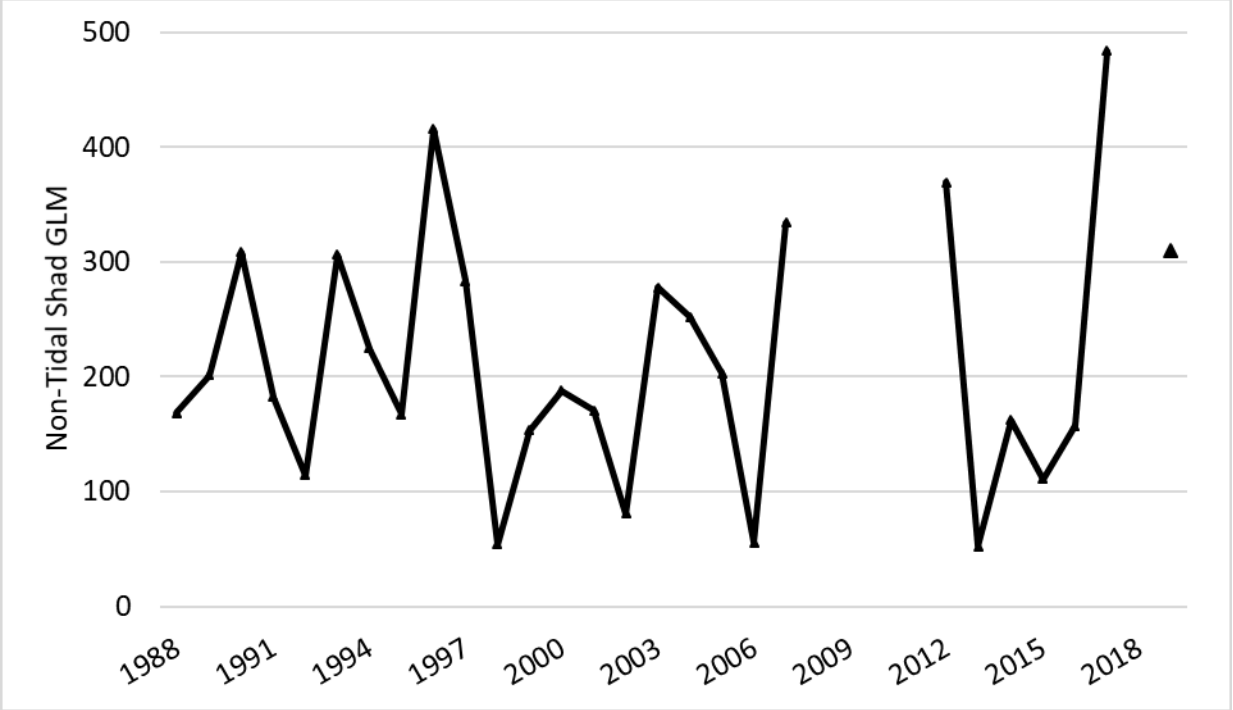

Figure 3. The generalized linear model of the juvenile abundance index (JAI) for American shad in the non-tidal Delaware River at Phillipsburg, Delaware Water Gap, and Milford.

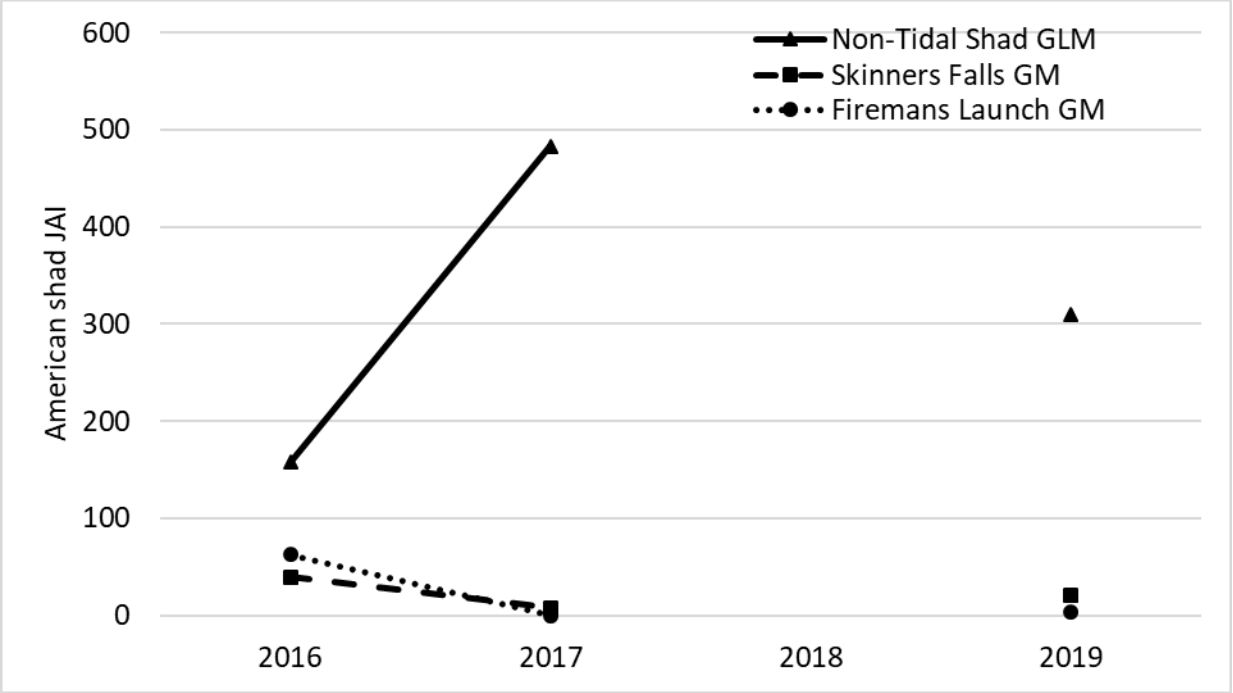

Figure 4. Non-Tidal American shad JAI for the Upper Delaware River (geometric means for Skinner's Falls and Fireman's Launch) compared to the Big 3 sites (generalized linear model for Phillipsburg, Water Gap, Milford).

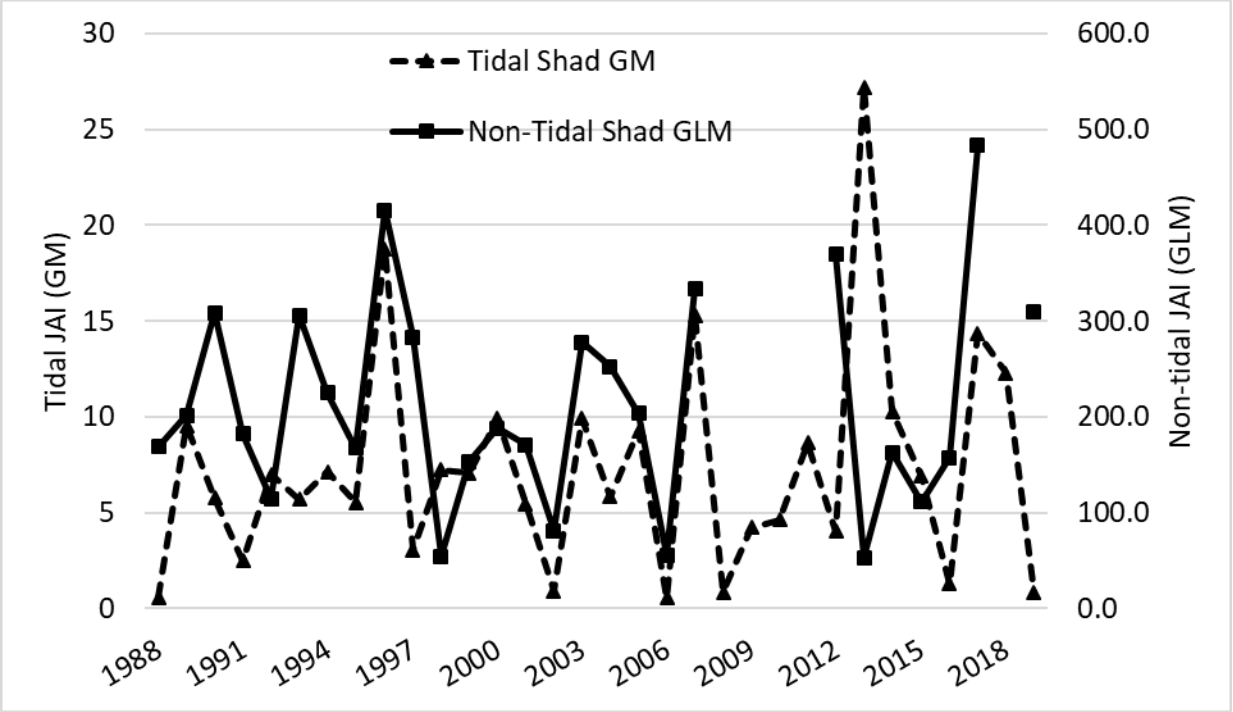

Figure 5. Comparison of the tidal to non-tidal JAI indices for American shad. Note there was no non-tidal sampling from 2008-2011 and 2018.

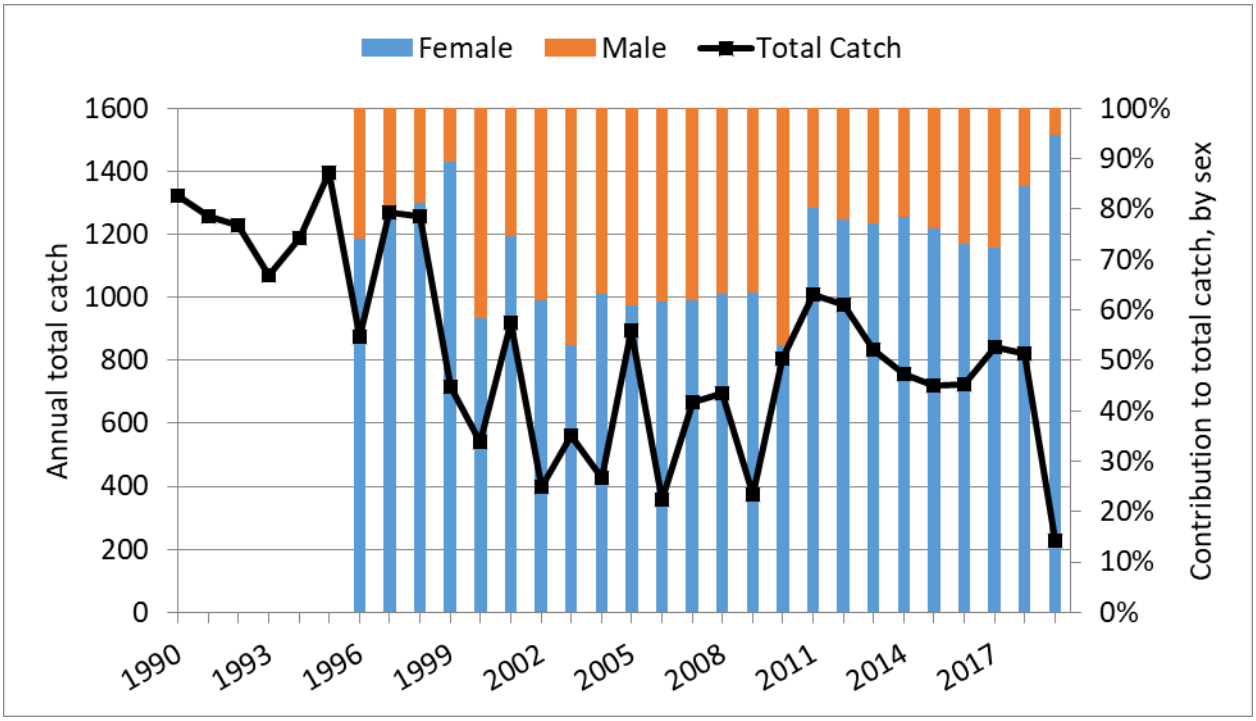

Figure 6. Total catch of American Shad at Smithfield Beach (RM 218), by sex. No biological data were recorded prior to 1996.

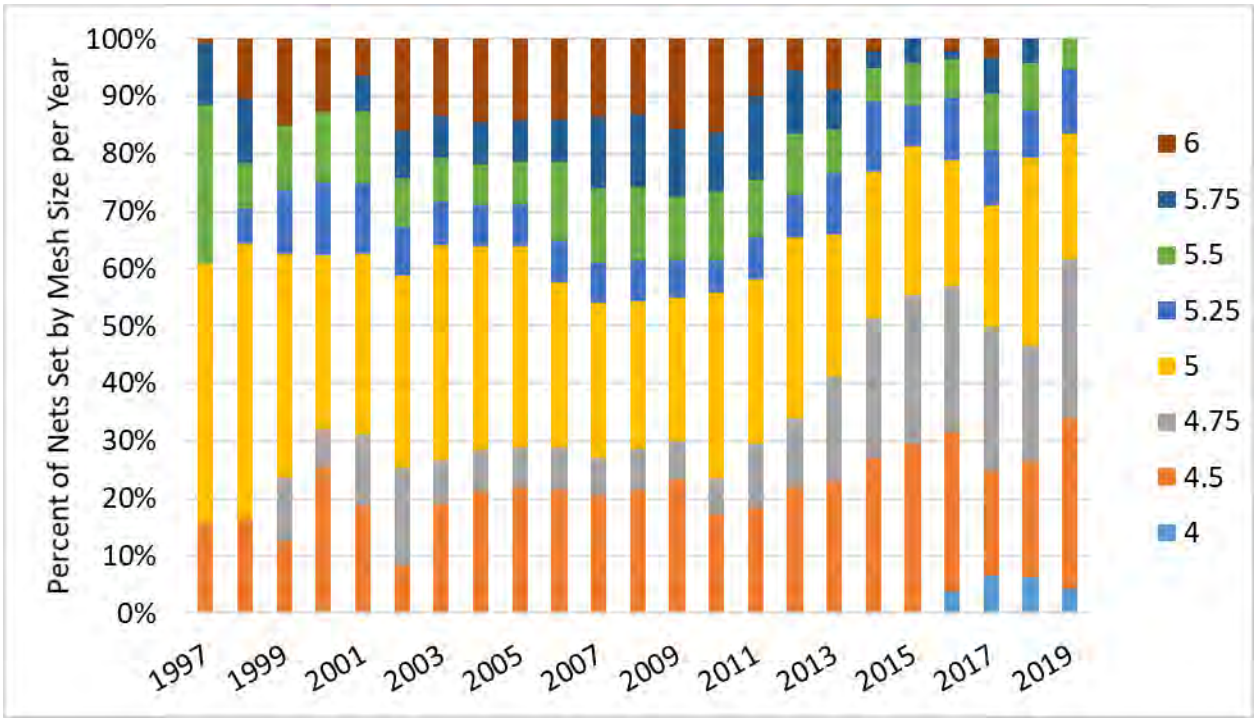

Figure 7. Frequency of gill net stretch mesh sizes deployed for brood stock and monitoring efforts at Smithfield Beach (RM 218).

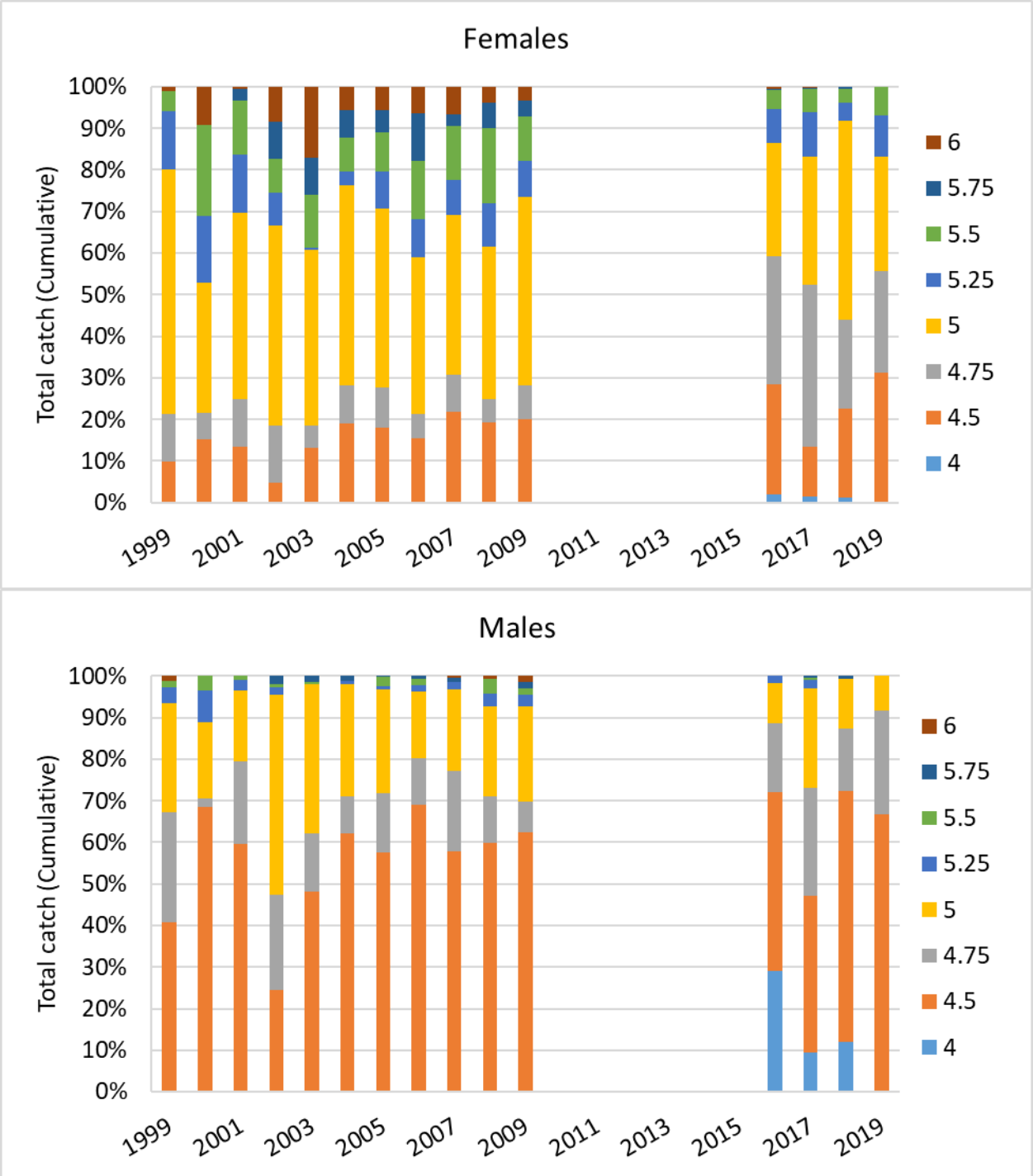

Figure 8. Percent of annual total catch of shad at Smithfield Beach (RM 218) by stretch mesh size (inch) deployed. Catch was not reported by mesh size prior to 1999 and 2010 through 2015.

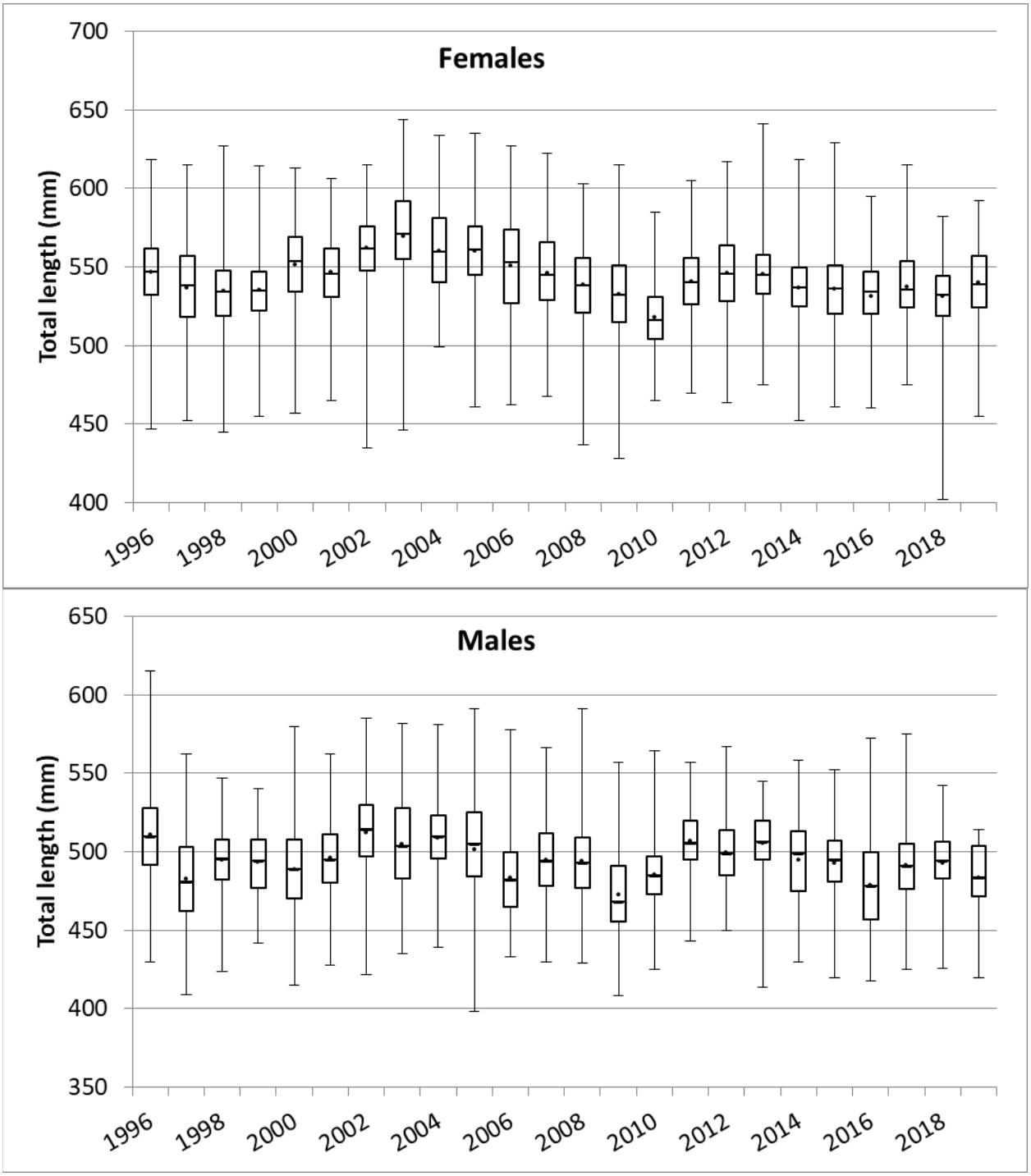

Figure 9. Size distribution of captured American shad at Smithfield Beach (RM 218). The boxes represent the 25 and 75th quartiles, with the whiskers extending to the 10th and 90th percentiles. Median (solid horizontal line) and average (asterisk) are also illustrated.

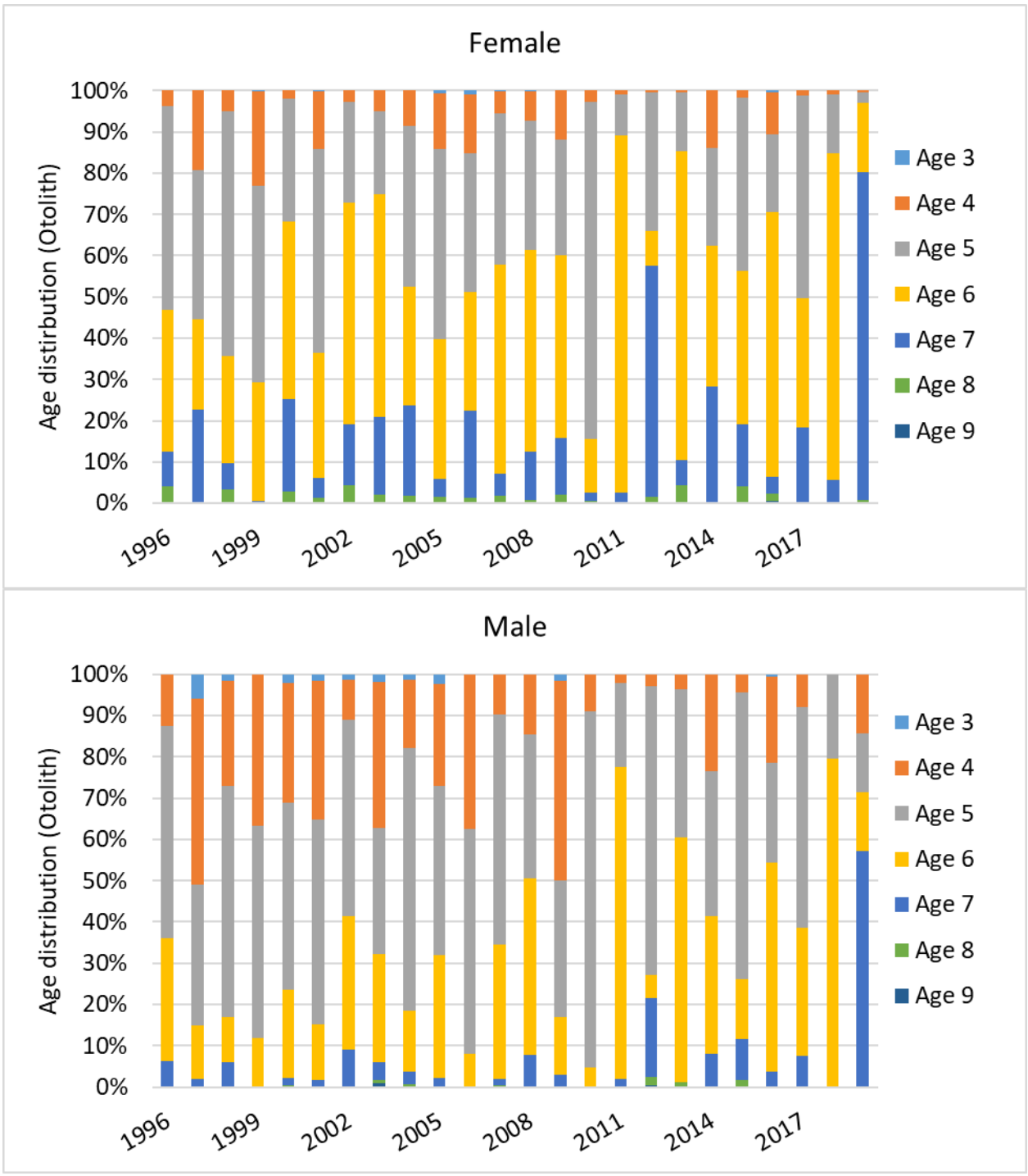

Figure 10. Age distribution by sex for American shad captured at Smithfield Beach as interpreted from otolith microstructures.

Figure 11. Mean size-at-age (mm TL) for female American Shad collected from Smithfield Beach, by stretch mesh size of capture. Trend lines, as linear least-squares regressions are depicted as dotted lines, for each respective age-class.

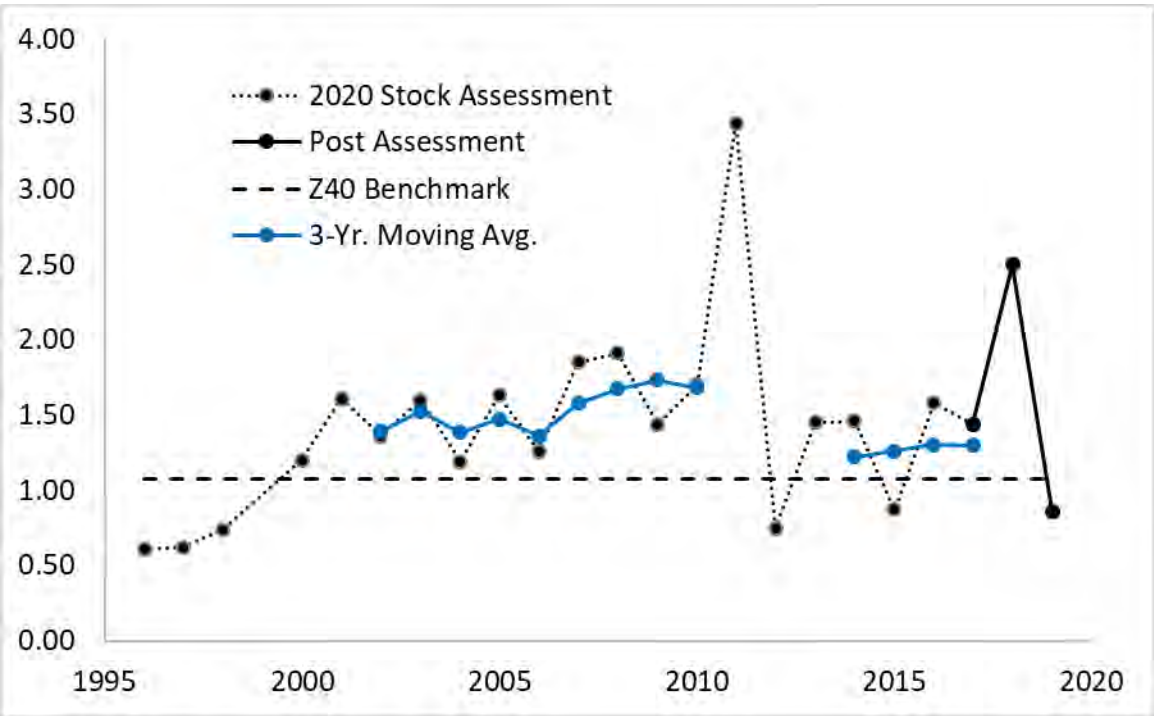

Figure 12. Female American shad total mortality for the Delaware River population.

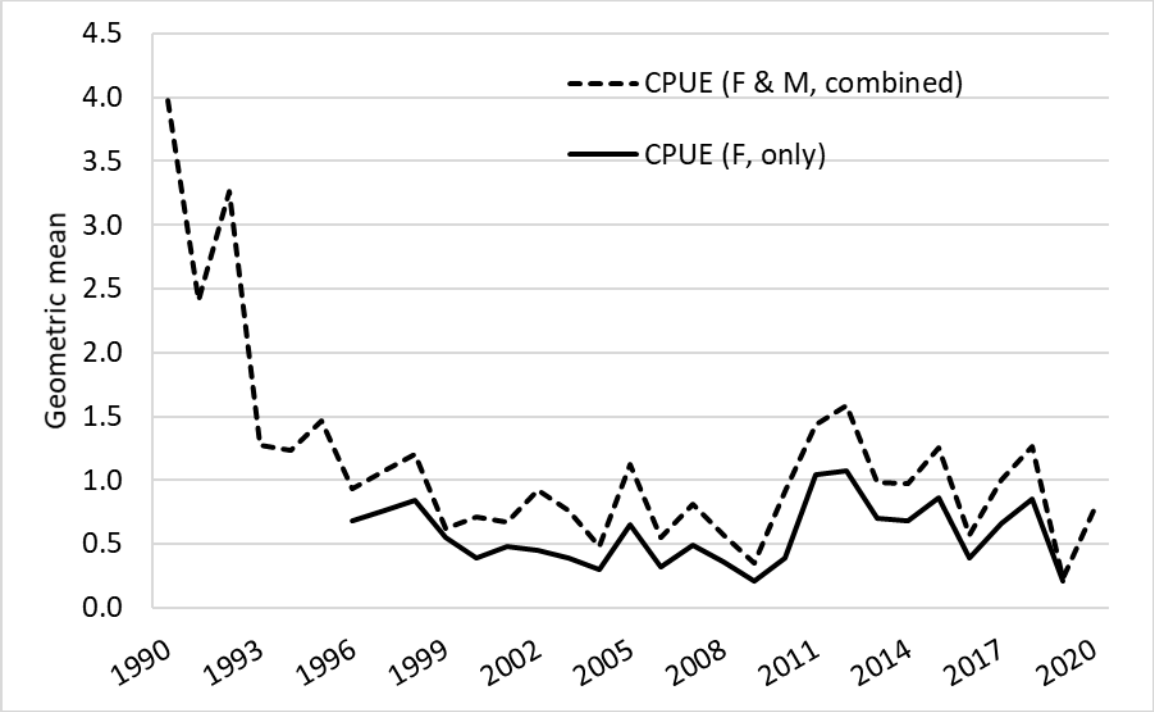

Figure 13. Time-series relative abundance (CPUE) for spawning adult catches at Smithfield Beach (RM 218).

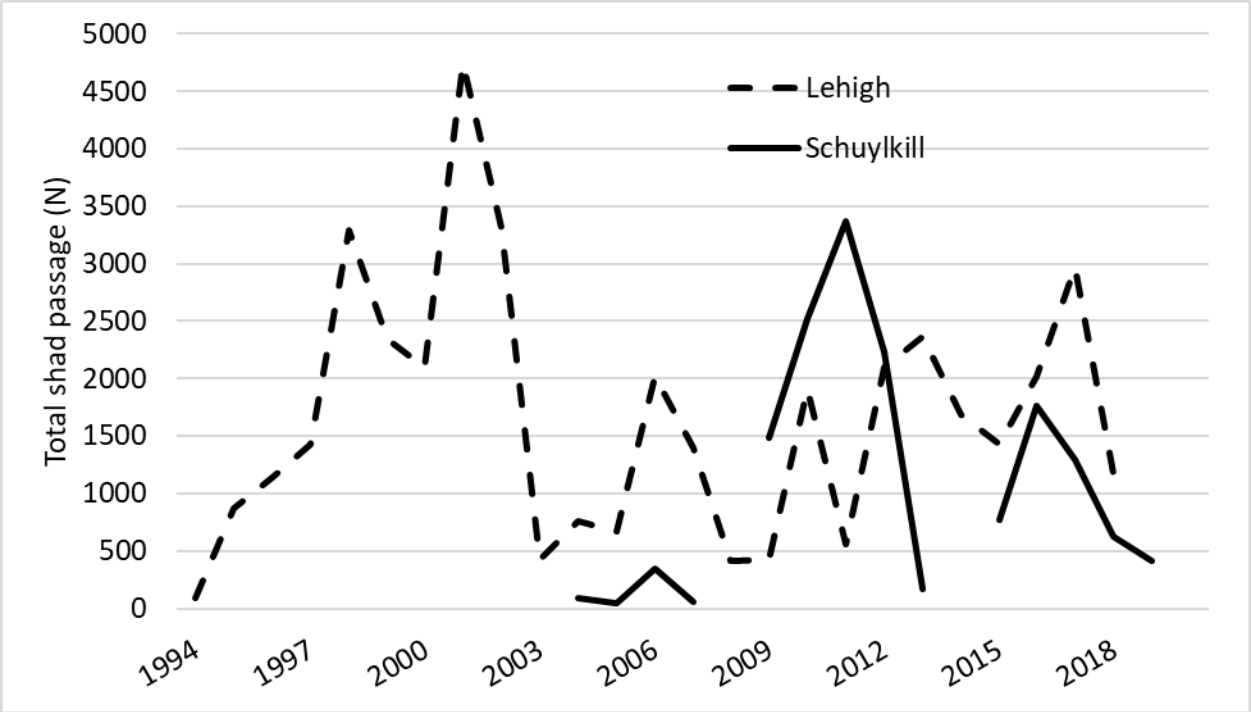

Figure 14. American shad passage in the Schuylkill and Lehigh Rivers.

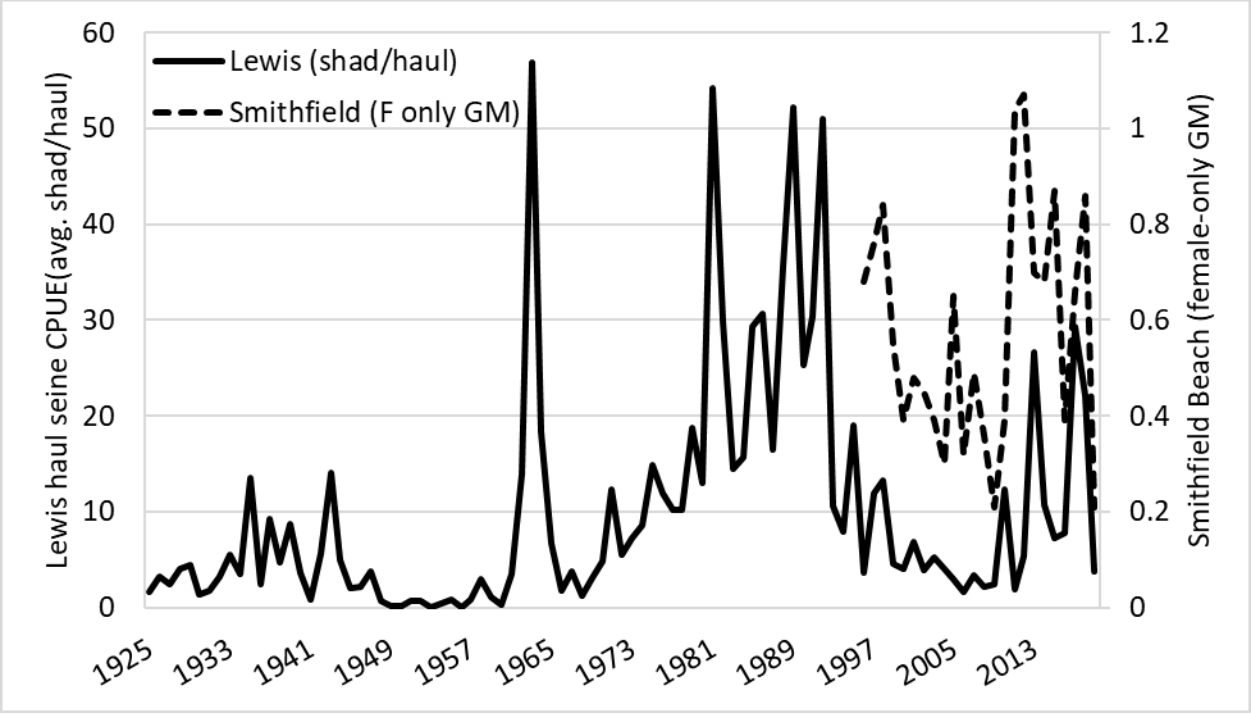

Figure 15. Lewis haul seine CPUE (avg. shad/haul) and Smithfield Beach (female-only geometric mean) indices of relative abundance.

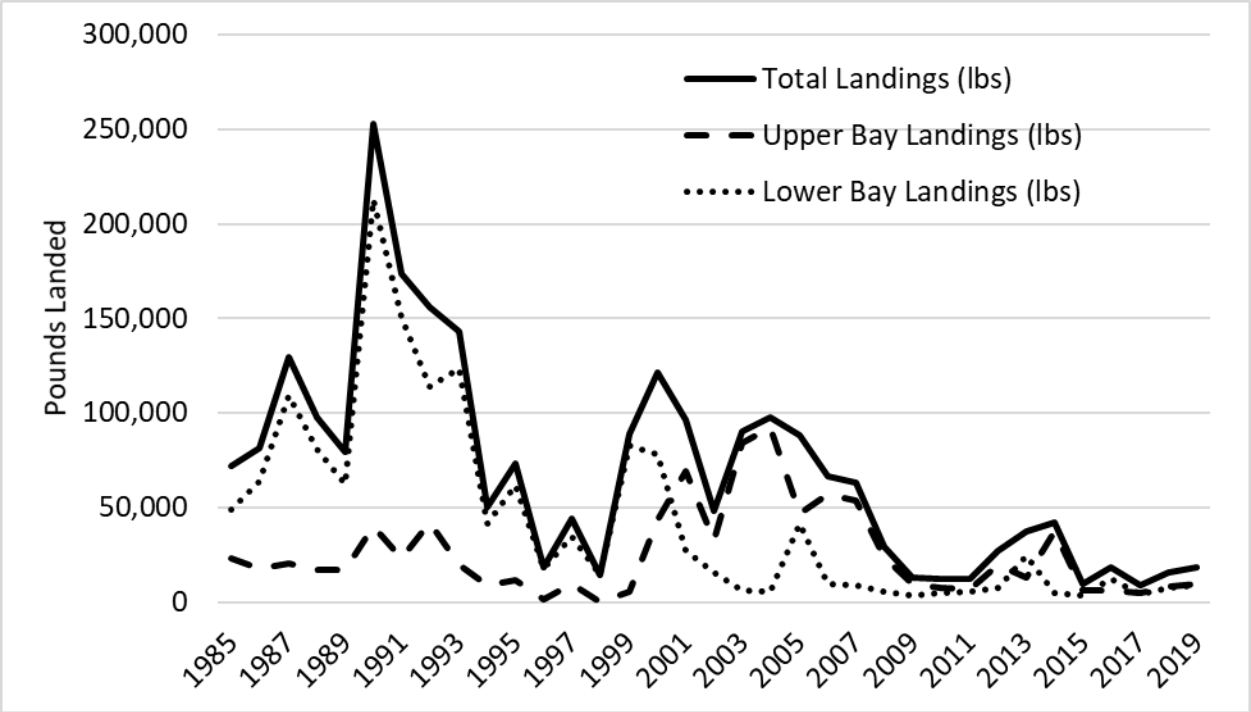

Figure 16. Commercial landings in the state of New Jersey. Upper and lower bay landings are delineated by harvest occurring north and south of Gandys Beach, NJ.

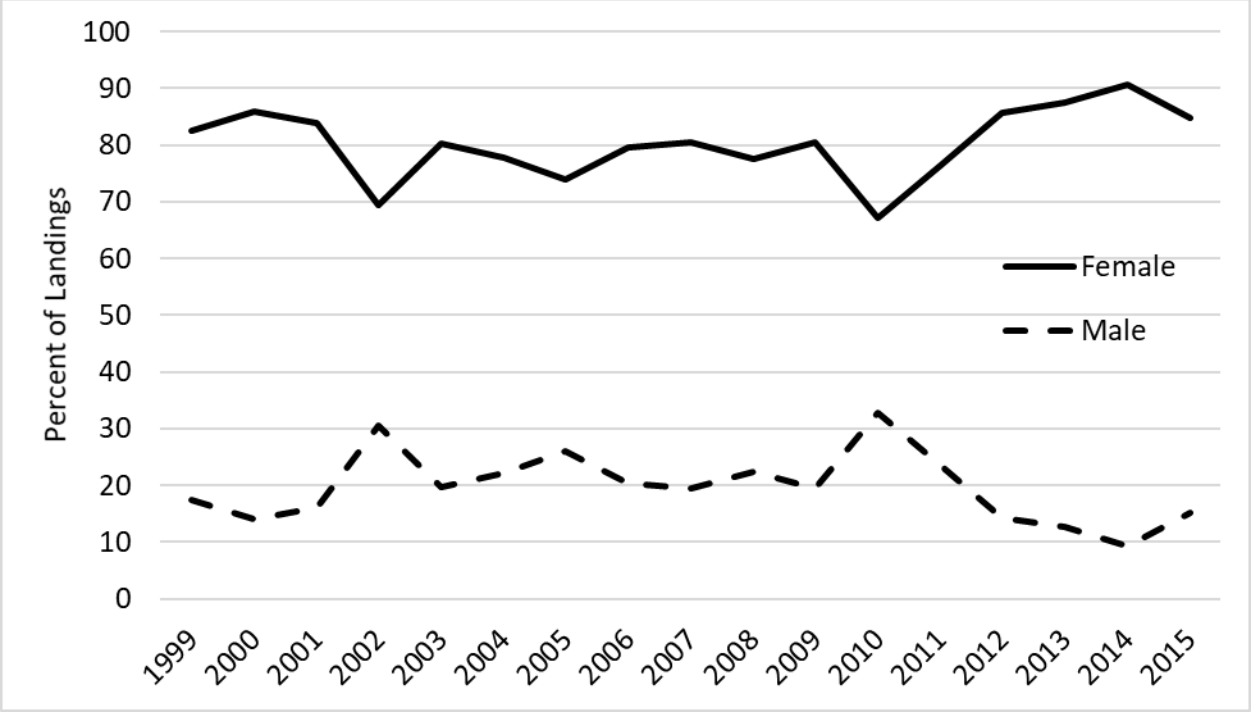

Figure 17. Sex composition of New Jersey's commercial gill net shad landings.

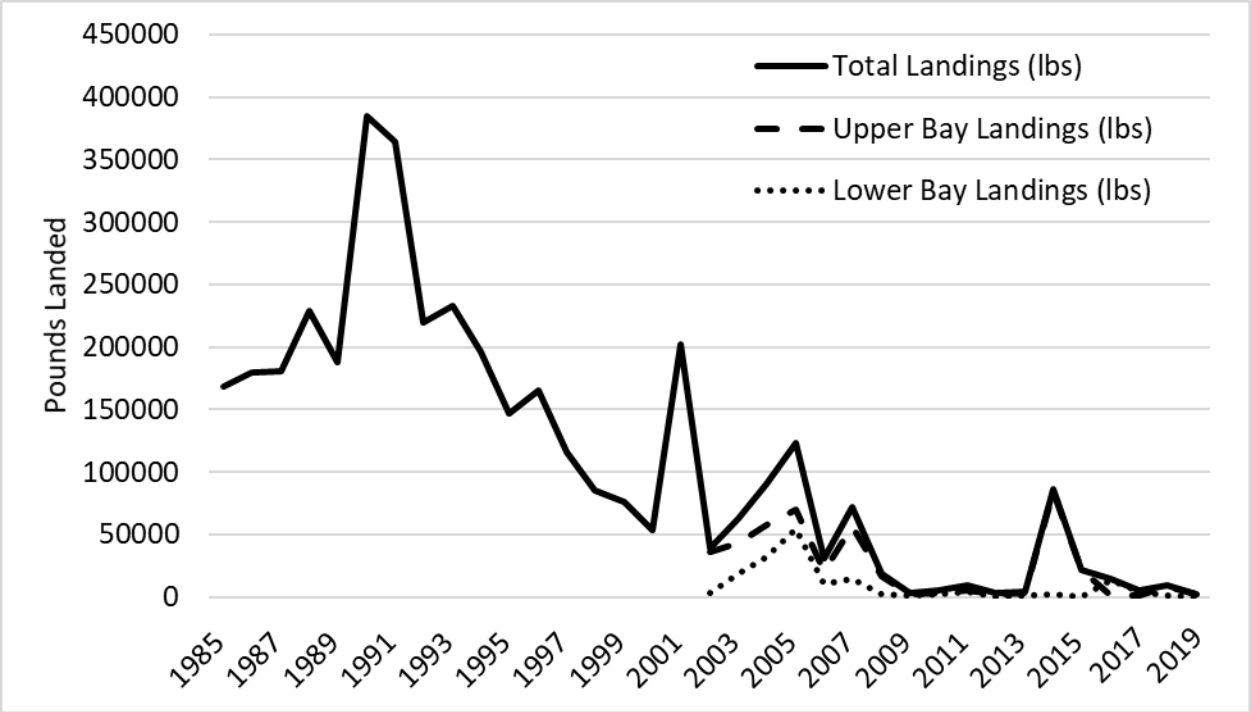

Figure 18. Commercial landings in the state of Delaware. Upper and lower bay landings are delineated by harvest occurring north and south of Bowers Beach, DE. Harvest location was not reported prior to 2002.

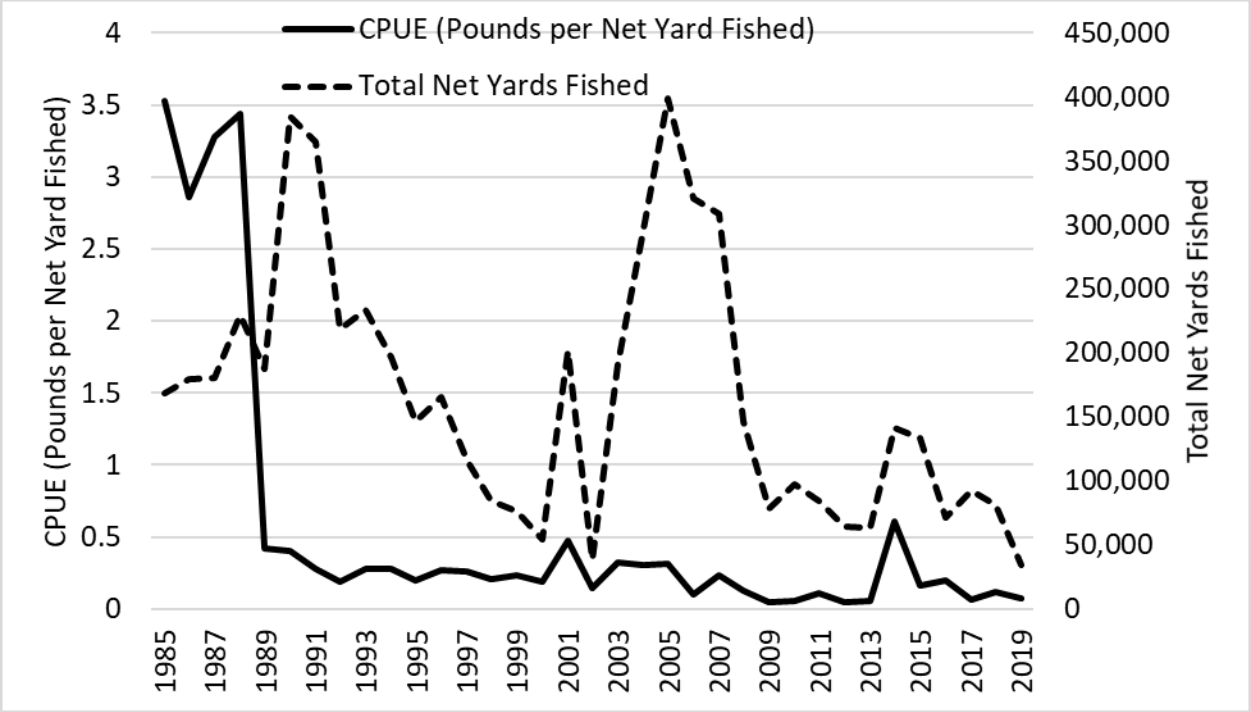

Figure 19. Delaware's catch per unit effort (CPUE) for the American shad commercial fishery.

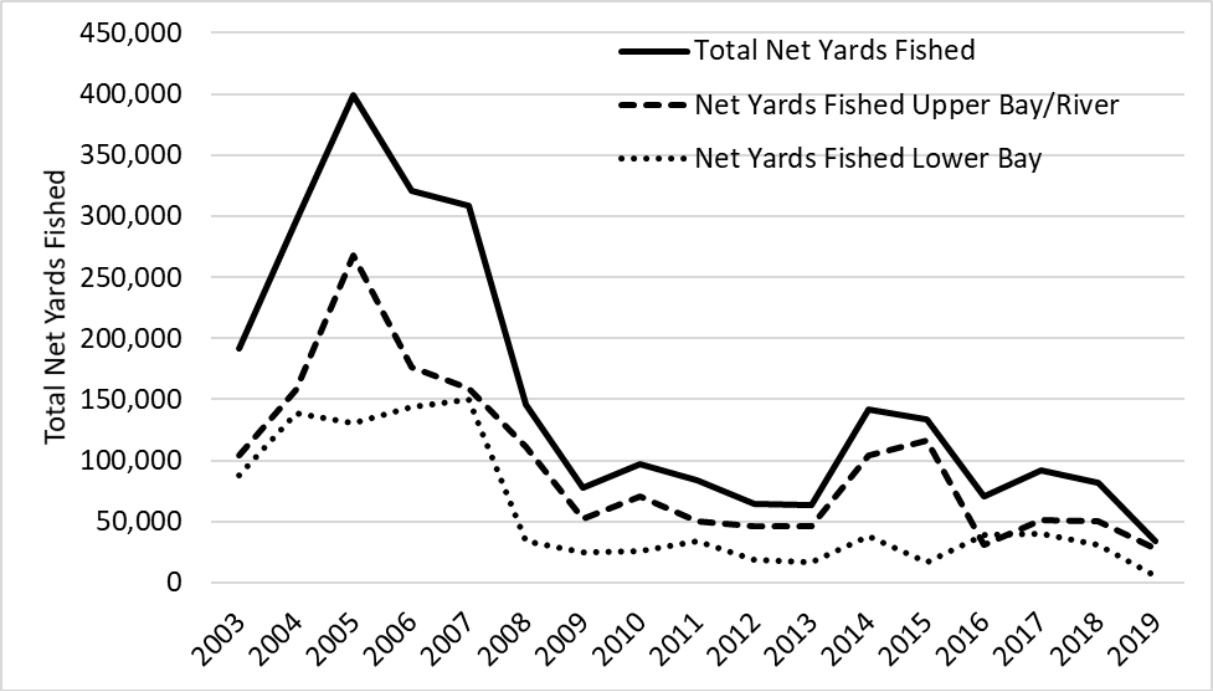

Figure 20. Delaware's gill net effort for the American shad commercial fishery. Upper and lower bay landings are delineated by harvest occurring north and south of Bowers Beach, DE. No collection location information were reported prior to 2002.

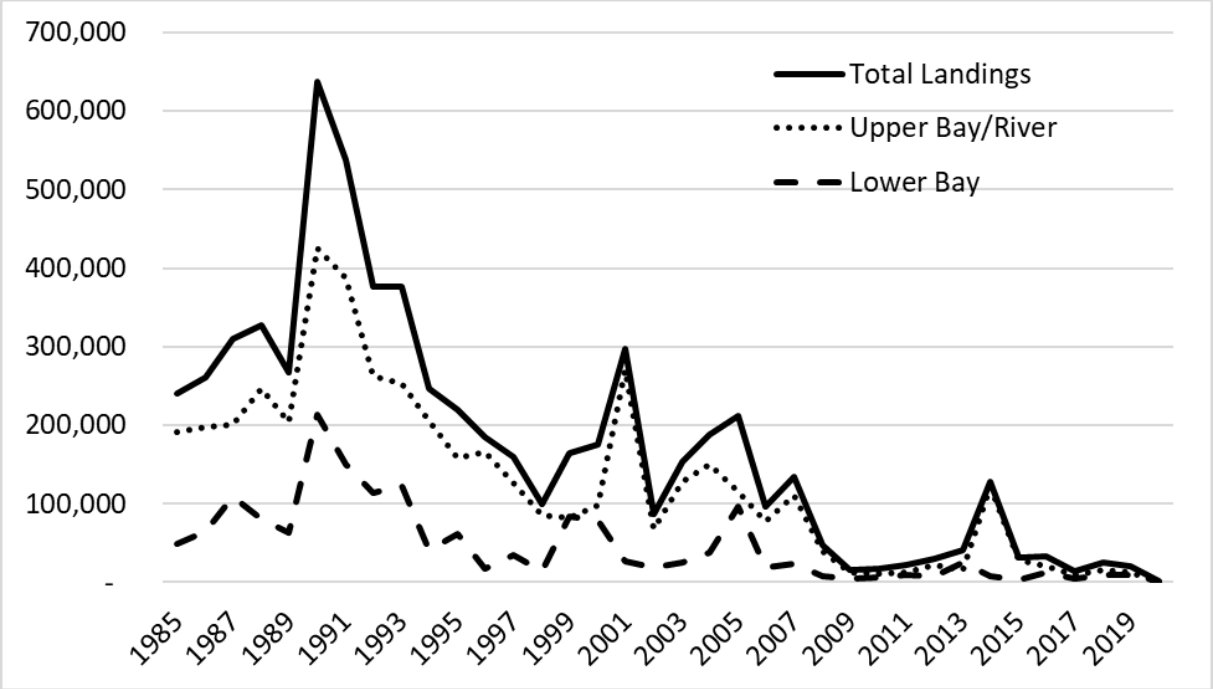

Figure 21. American shad commercial harvest for the states of Delaware and New Jersey, in pounds.

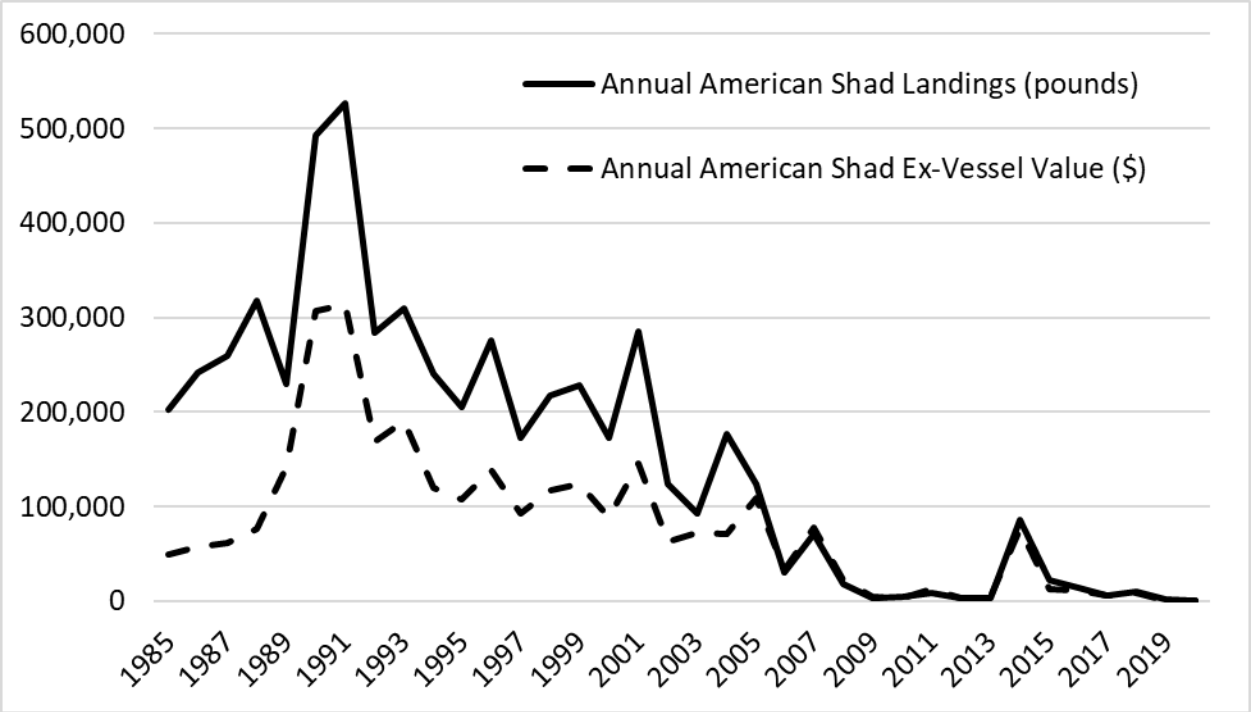

Figure 22. Pounds landed and market value for American shad landed in the State of Delaware.

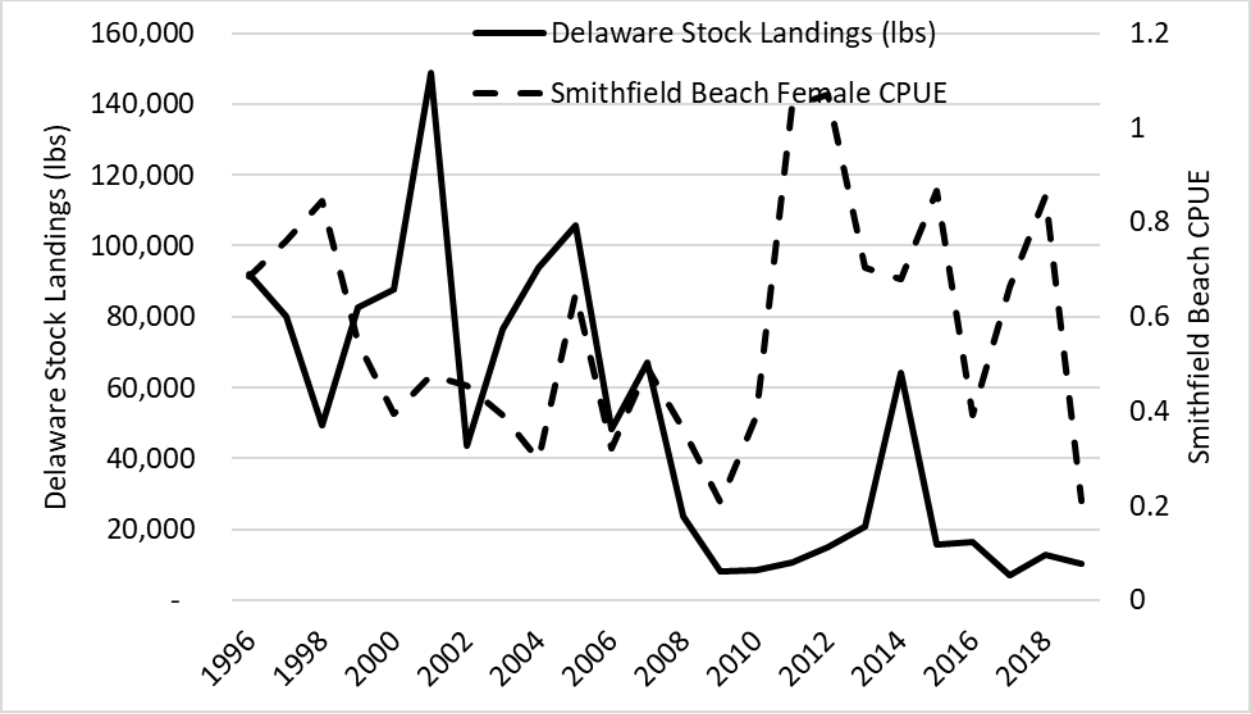

Figure 23. Comparison of trends between Delaware River stock landings and Smithfield Beach female American shad CPUE.

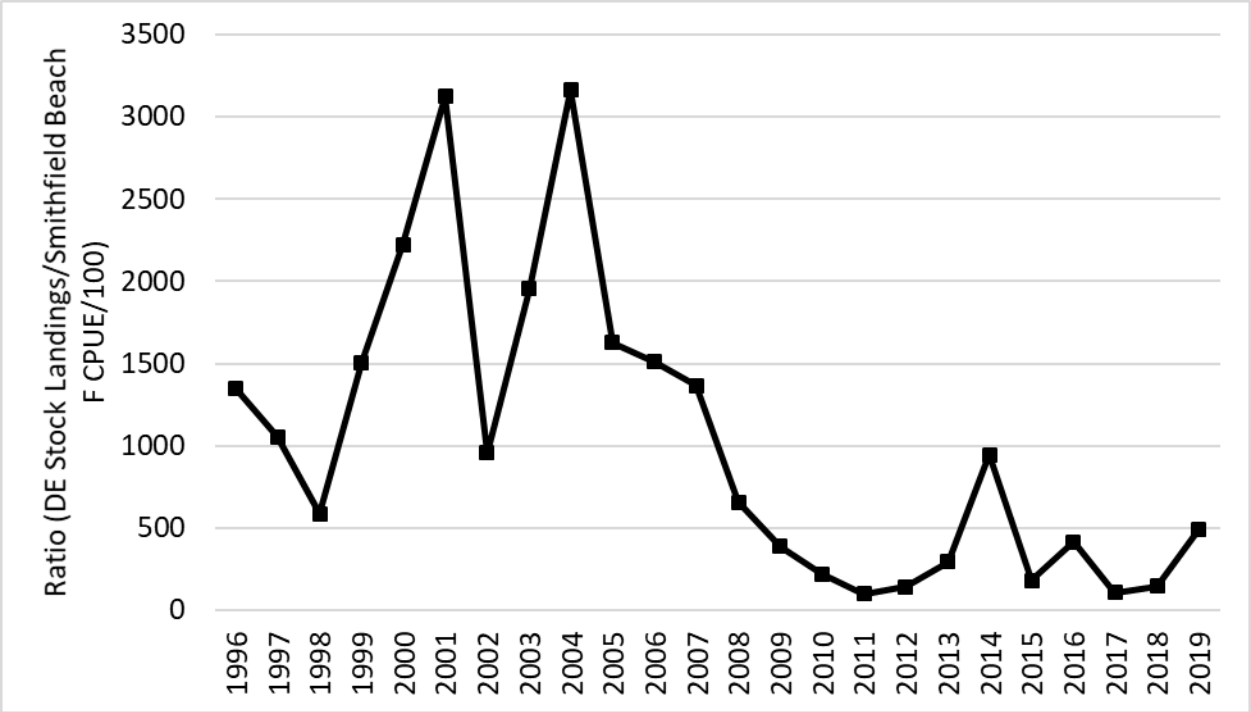

Figure 24. Ratio of Delaware River stock landings divided by Smithfield Beach CPUE (divided by 100).

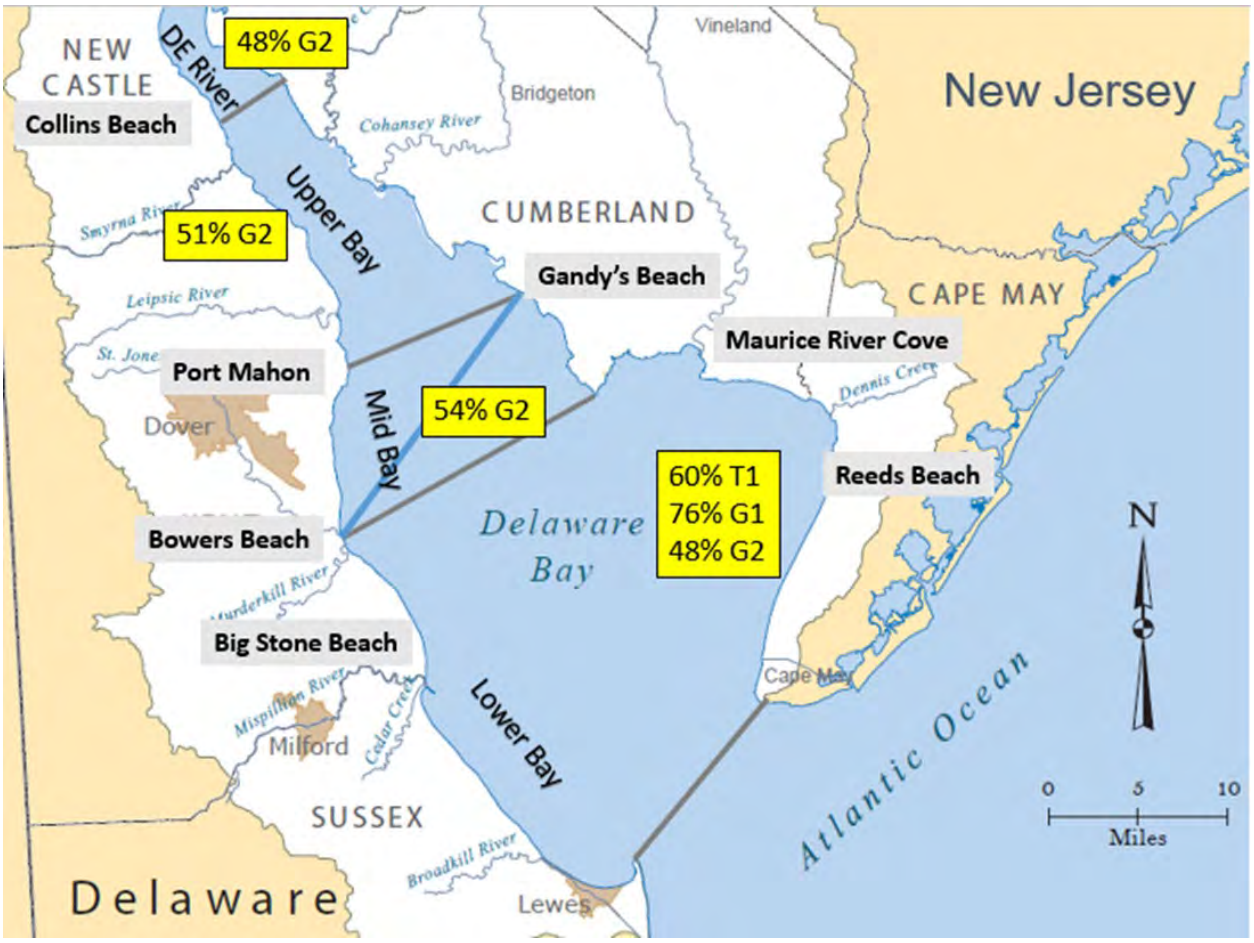

Figure 25. Map of the lower Delaware River and Bay, delineating harvest reporting regions for Delaware (n=4) and New Jersey (n=2, grey lines), demarcation line from 2017 SFP (blue), and proportions of mixed (non-Delaware Bay) stock by region based on study. T1 = New Jersey Tagging Study off Reeds Beach, NJ 1995-2020; G1 = Waldman et. al 2014 genetics study off Big Stone Beach, DE and Maurice River Cove, NJ 2010; G2 = U.S. Fish and Wildlife Service genetics study from 2017-2020, various locations sampled from the commercial fishery.

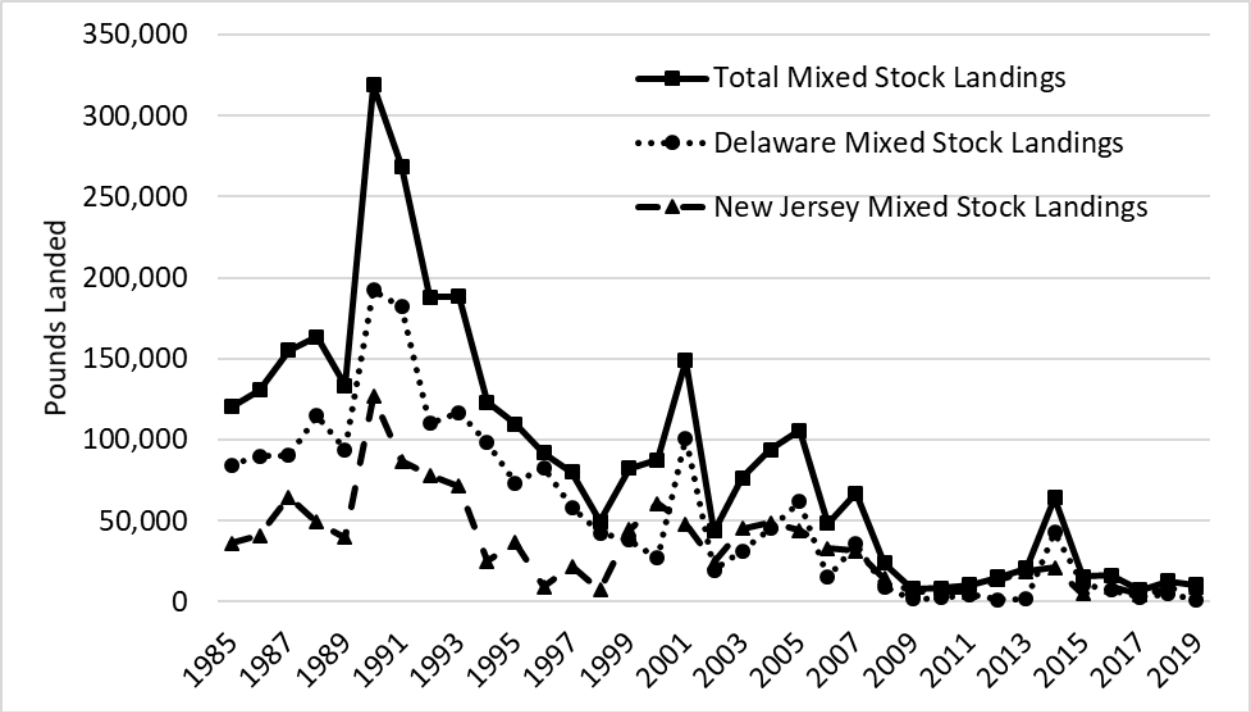

Figure 26. American shad landings (pounds) assigned to the mixed stock fisheries.

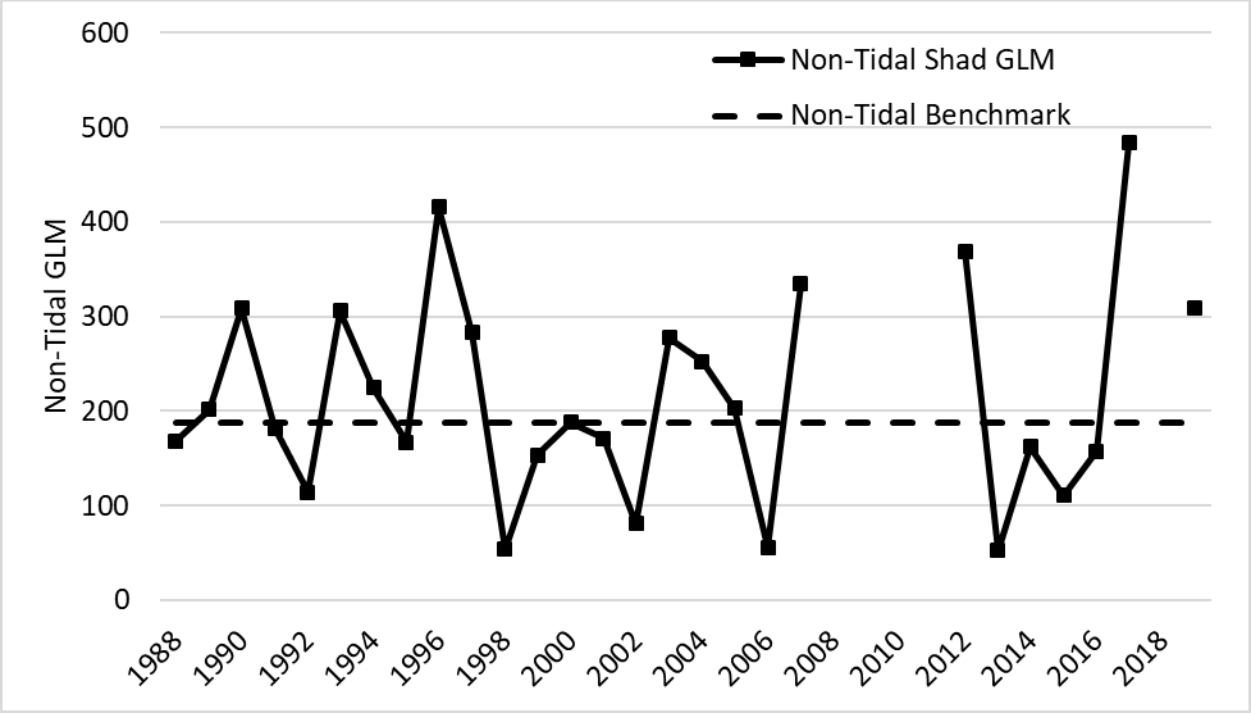

Figure 27. The Delaware River non-tidal American shad JAI (GLM) with a 50th percentile benchmark. Note that the benchmark value may change annually based on updated GLM analysis.

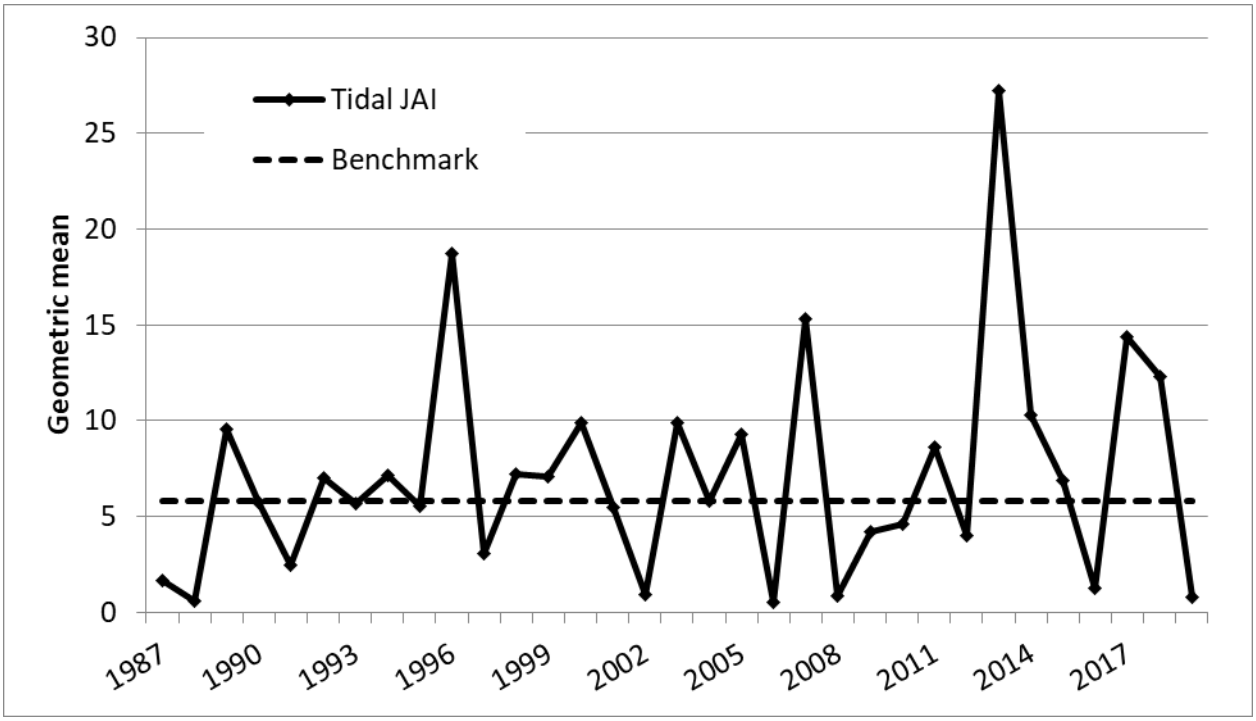

Figure 28. The Delaware River tidal American Shad JAI (GM) with a 50th percentile benchmark. The GM values are based on catches from Region 2 and 3 of the NJDFW tidal seine sites.

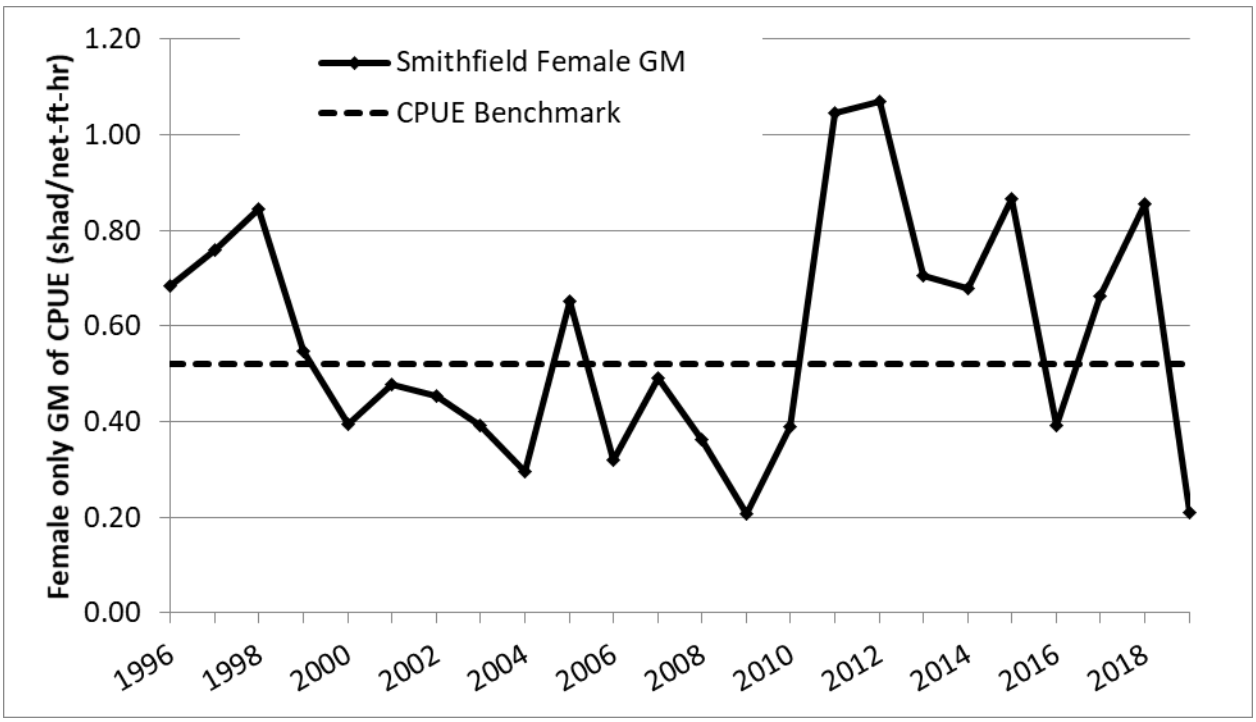

Figure 29. The Delaware River spawning adult female American shad index at Smithfield Beach (RM 218) with a 50th percentile benchmark.

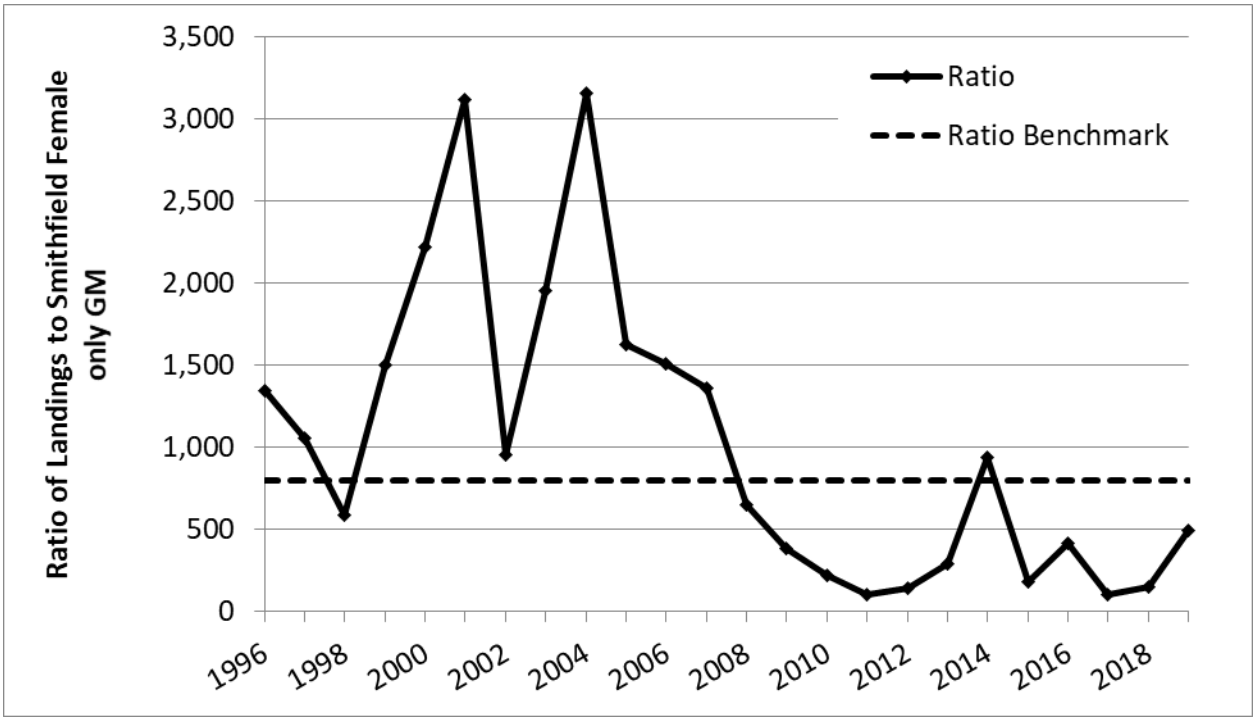

Figure 30. Ratio of Delaware River stock landings divided by Smithfield Beach female shad GM (divided by 100) with a 50th percentile benchmark: 1990-2019.

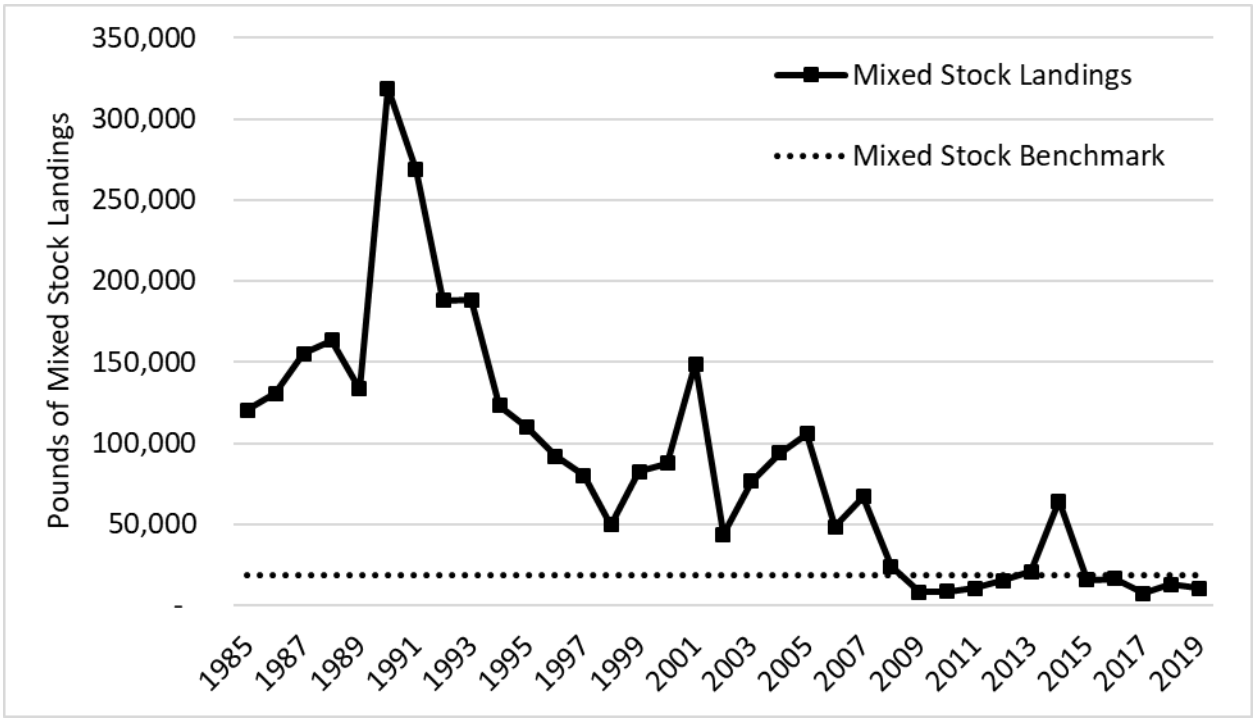

Figure 31. American shad landings in the Delaware Bay from the mixed stock fishery with a 25th percentile benchmark.

10. Tables

Table 1. New Jersey commercial fishing regulations for 2022.

System	Season	Gear Limits	Mandatory Reporting	Other Restrictions
Delaware Bay & River	Gill nets: Feb 1-Dec 15	Stretch mesh min.: 2.75” Feb 1-Feb 29 *3.25” Mar 1-Dec 15 Length: 2400’ Feb 12-May 15 1200’ May 16-Dec 15	YES	Limited entry; gear restrictions in defined areas
	---	---		
	Haul Seine: Nov 1-Apr 30	2.75" min. stretch mesh, max length 420'		

*except with special permit

Table 2. Number of permits issued to New Jersey fishermen and number reporting landings annually in the Delaware Bay 2000-2021.

Year	Total Permits Issued	Active Permits	Permits Reporting Landings
2000	-	-	28
2001	-	-	29
2002	-	-	21
2003	-	-	24
2004	-	-	24
2005	-	-	24
2006	-	-	25
2007	-	-	17
2008	-	-	14
2009	-	-	16
2012	83	51	11
2013	71	47	13
2014	71	47	11
2015	71	47	9
2016	71	47	9
2017	71	47	12
2018	70	44	11
2019	70	43	9
2020	70	43	4
2021	70	43	4

Table 3. New Jersey's gill net effort data for the American shad commercial fishery.

	No. of Fishermen			No. of Man-days			Square Feet of Net			Pounds Harvested			Pounds/Square Foot		
Year	Upper Bay	Lower Bay	Comb.	Upper Bay	Lower Bay	Comb.	Upper Bay	Lower Bay	Comb.	Upper Bay	Lower Bay	Comb.	Upper Bay	Lower Bay	Comb.
2012	8	3	11	44	38	82	1,338,500	117,600	1,456,100	19,923	7,445	27,368	0.016	0.051	0.019
2013	9	4	13	54	55	109	1,369,040	654,000	2,023,040	13,204	24,455	37,659	0.018	0.02	0.019
2014	3	8	11	82	34	116	2,458,400	186,480	2,644,880	37,319	5,059	42,378	0.015	0.027	0.016
2015	7	2	9	52	38	90	1,357,200	256,000	1,613,400	6,013	3,405	9,418	0.004	0.013	0.006
2016	5	4	9	39	84	123	2,401,200	1,208,640	3,609,840	6,222	12,155	18,377	0.003	0.010	0.005
2017	8	4	12	47	56	103	544,300	638,960	1,183,260	4,535	4,197	8,762	0.008	0.007	0.007
2018	7	7	11	62	62	124	692,945	1,288,015	1,980,960	8,012	7,726	15,738	0.012	0.006	0.008
2019	7	6	9	47	69	116	306,825	833,825	1,140,650	9,680	8,619	18,299	0.032	0.010	0.016

Table 4. Mean Fork length (mm) of American shad captured in New Jersey's tagging gill net surveys.

Year	Number	Male	Female	Sexes Combined	Range	Std. Dev.	Stretch Mesh (inches)
1995	107			483.7	405-605	30.8	5.5-6.0
1996	294			467.7	384-567	33.6	4.5-6.0
1997	500			448.4	346-600	34.1	5.0-6.0
1998	554			460.4	383-605	28.5	5.0-6.0
1999	753			465.1	375-563	26.2	5.0-5.75
2000	425			455.9	382-547	25.2	5.0-6.0
2001	663			474.1	396-615	29.6	5.0-6.0
2002	273	452.8	483.1	476.8	375-573	32.9	5.0-6.0
2003	170	451.4	477.4	472.2	401-538	27.1	5.0-6.0
2004	51	447.5	497.4	489.6	414-575	38.7	5.0-6.5
2005	220	445.2	477.5	470.6	402-586	36.7	5.0-6.5
2006	73	453.6	484	480.3	406-584	37.3	5.5
2007	42	444.5	478.2	476.6	426-571	32.9	5.5-6.5
2008	0						
2009	11	423.3	477.9	455	387-523	46	5.0-6.0
2010	85	430.9	457.9	447.1	366-518	32.3	5.0-6.0
2011	17	444.71	489.58	473.05	425-538	34	5.0-6.0
2012	18	435.67	485.67	477.33	459-515	26.7	5.0-6.0
2013	17		481.32	481.32	443-507	16.7	5.5-6.0
2014	18	444.25	485.77	476.11	395-525	33.6	5.5-6.0
2015	10	457	481.2	469.1	437-500	11	5.5-6.0
2016	94	466.6	473.5	472.8	409-529	23	5.5-6.0
2017	10	427	476	461.3	412-510	32.6	5.5-6.0
2018	36	440	469.4	467.4	414-518	27.3	5.0-6.0
2019	66	465.3	465.8	467.4	401-551	28.9	5-5.5

Table 5. Delaware's gill net effort for the American Shad commercial fishery. Upper and lower bay landings are delineated by harvest occurring north and south of Bowers Beach, DE.

Year	No. of Fishermen				No. Vessel Trips				Net Yards Fished				Pounds Harvested				Pounds/Net Yard			
	Upper Bay/River Anchor	Upper Bay/River Drift	Lower Bay Anchor	Lower Bay Drift	Upper Bay/River Anchor	Upper Bay/River Drift	Lower Bay Anchor	Lower Bay Drift	Upper Bay/River Anchor	Upper Bay/River Drift	Lower Bay Anchor	Lower Bay Drift	Upper Bay/River Anchor	Upper Bay/River Drift	Lower Bay Anchor	Lower Bay Drift	Upper Bay/River Anchor	Upper Bay/River Drift	Lower Bay Anchor	Lower Bay Drift
2003	18	12	8	2	271	85	117	4	71,145	32,743	85,100	2,500	38,290	5,161	18,742	118	0.54	0.16	0.22	0.05
2004	19	13	9	3	348	76	186	21	125,140	33,300	121,040	17,400	53,779	4,221	31,242	851	0.43	0.13	0.26	0.05
2005	23	23	4	3	302	270	107	69	138,440	129,900	68,310	62,400	46,377	22,961	35,114	19,113	0.33	0.18	0.51	0.31
2006	26	12	8	7	308	121	154	37	117,325	59,050	107,820	36,400	18,265	2,211	8,814	1,235	0.16	0.04	0.08	0.03
2007	23	17	6	8	270	114	135	67	117,540	41,100	99,275	50700	49,668	7,157	10,402	4,211	0.42	0.17	0.1	0.08
2008	22	15	3	6	212	108	5	49	65,689	45,870	3,800	30,675	13,930	2,137	34	2,232	0.21	0.05	0.01	0.07
2009	19	14	2	6	99	38	5	22	30,352	22,450	5,000	20,200	2,032	404	92	918	0.07	0.02	0.02	0.05
2010	13	12	1	4	85	54	12	24	40,800	30,250	3,050	23,000	1,529	1,694	409	1,387	0.04	0.06	0.13	0.06
2011	17	10	1	5	98	50	13	33	30,830	19,400	5,200	28,600	3,531	1,721	1,159	2,722	0.11	0.09	0.22	0.1
2012	10	7	0	6	63	45	0	28	21,850	24,050	0	18,400	1,216	1,095	0	429	0.06	0.05	0	0.02
2013	10	9	0	3	45	63	0	18	14,900	31,000	0	17,200	778	1,715	0	784	0.05	0.06	0	0.05
2014	11	4	1	5	173	13	1	44	97,435	6,300	1,000	36,800	83,400	299	2	2,093	0.86	0.05	0	0.06
2015	11	4	0	4	143	27	0	20	96,500	20,380	0	17,000	21,091	420	0	254	0.22	0.02	0	0.01
2016	6	6	3	4	41	38	16	34	16,545	14,652	11,300	28,300	4,273	9,342	211	425	0.26	0.64	0.02	0.02
2017	8	4	0	7	76	25	0	74	26,820	24,700	0	40,500	4,430	89	0	1,070	0.17	0	0	0.03
2018	9	3	0	3	92	16	0	34	43,361	7,400	0	31,000	7,491	840	0	1,307	0.17	0.11	0	0.04
2019	7	2	0	3	55	4	0	8	26,860	1,350	0	5,700	2,265	26	0	113	0.08	0.02	0	0.02

Table 6. Number of permits issued to Delaware fishermen and number reporting American shad landings annually.

Year	Total Permits Issued	Active Permits	Permits Reporting Landings
2000	110	84	56
2001	111	75	53
2002	108	72	46
2003	110	70	41
2004	110	66	44
2005	111	67	52
2006	111	63	45
2007	111	59	41
2008	111	56	38
2009	111	60	35
2010	111	56	29
2011	111	56	30
2012	111	59	20
2013	111	54	20
2014	111	52	19
2015	111	51	19
2016	111	20	12
2017	111	48	16
2018	111	44	16
2019	111	45	11

Table 7. The State of Delaware summary of biological data collected on American shad from Delaware and New Jersey commercial fishers.

Year	Number	Mean TL (mm)	Mean WT (lbs)
1999	370	510	4.8
2000	250	506	N/A
2001	250	521	3.5
2002	189	517	N/A
2003	186	528	4.0
2004	37	548	4.6
2005	190	539	4.6
2006	294	523	5.3
2007	245	512	4.9
2008	N/A	N/A	N/A
2009	N/A	N/A	N/A
2010	150	510	N/A
2011	335	534	4.3
2012	432	541	4.2
2013	251	533	3.5
2014	270	473	3.0
2015	299	507	2.8
2016	300	518	2.58
2017	32	504	3.41
2018	223	531	3.68
2019	21	522	3.59

Table 8. American shad tag returns, by year, from fish tagged in New Jersey's Tagging program off Reed's Beach in Delaware Bay.

Year	American Shad Tagged	Recaptures
1995	107	10
1996	294	14
1997	500	36
1998	554	38
1999	753	46
2000	425	32
2001	663	35
2002	273	15
2003	170	7
2004	51	0
2005	220	9
2006	73	2
2007	42	1
2008	0	0
2009	11	1
2010	85	3
2011	17	0
2012	18	0
2013	17	0
2014	18	2
2015	10	1
2016	94	2
2017	10	0
2018	36	1
2019	66	0

Table 9. Recaptures of American Shad tagged in New Jersey's Tagging program off Reed's Beach in Delaware Bay.

Recapture Location	Number of Reports	Percent of Reports
St. Lawrence River, Quebec	1	0.4
New Brunswick, Canada	3	1.2
Shubenacadie River, Nova Scotia	1	0.4
Atlantic Ocean and Rivers, RI	3	1.2
Connecticut River	40	15.9
Hudson River	44	17.5
Atlantic Ocean, NY	3	1.2
Atlantic Ocean, NJ	38	15.1
Delaware Bay/River	101	40.2
Atlantic Ocean, DE	4	1.6
Atlantic Ocean, MD	1	0.4
Atlantic Ocean, VA	1	0.4
Chesapeake Bay and Tribs	7	2.8
Atlantic Ocean and Rivers, NC	2	0.8
Santee River, SC	1	0.4
Unknown Location	1	0.4

Table 10. Assignment of stock origin for American shad collected in the Delaware Bay off Big Stone Beach (n=191) and Maurice River Cove (n=31) in 2010 from 33 baseline rivers (condensed, from Waldman et. al, 2014).

Region of Stock Origin	Percent Assignment
Northern region	12.6
Connecticut River	13.7
Hudson River	34.4
Delaware River	24.2
Chesapeake Bay	9.5
Southeastern region	5.6

Table 11. Assignment of stock origin for American shad collected in the Delaware Bay and River from 2017-2020 (from Bartron and Prasko, 2021). Bay demarcations can be found in Figure 25.

Region	Number Samples Taken	Percent Assigned to Delaware Stock	Percent Assigned to non-Delaware Stock
Smithfield Beach, PA	100	70	30
Lambertville, NJ	246	58	42
Schuylkill River, PA	22	64	36
Delaware River	23	52	48
Upper Bay	73	49	51
Mid-Bay	145	46	54
Lower Bay	343	52	48

Table 12. Marine Recreational Information Program (MRIP) characterization of recreational American shad harvest in the Delaware Estuary and Bay. PSE = Percent Standard Error.

	Recapture Location			
	Delaware		New Jersey	
Year	Total Harvest	PSE	Total Harvest	PSE
1994	13,218	68.8	18,706	101
1995				
1996				
1997			7,380	102.2
1998				
1999	5,601	61.2		
2000				
2001			96,971	94.4
2002				
2003	14,408	103.3		
2004				
2005				
2006				
2007				
2008				
2009				
2010	7,016	103.5	26,050	99.8
2011	16,598	102.1		
2012			32,511	99.7
2013				
2014				
2015				
2016				
2017				
2018				
2019	235	97.9		

Table 13. Number of American shad fry stocked in the Delaware River Basin. Due to COVID-19 social restrictions, PFBC hatchery operations were closed for the 2019 season.

Year	Delaware River	Lehigh River	Schuylkill River
1985		600,000	251,980
1986		549,880	246,400
1987		489,980	194,575
1988		340,400	
1989		2,087,700	316,810
1990		793,000	285,100
1991		793,000	75,000
1992		353,000	3,000
1993		789,600	
1994		642,200	
1995		1,044,000	
1996		993,000	
1997		1,247,000	
1998		948,000	
1999		501,000	410,000
2000		447,900	535,990
2001		675,625	490,901
2002		85,025	2,000
2003		783,013	1,000,448
2004		366,414	521,583
2005	169,802	668,792	545,459
2006	52,782	293,083	253,729
2007	47,587	276,000	540,655
2008	158,151	696,785	486,774
2009		210,584	161,938
2010		347,522	380,000
2011		473,366	643,361
2012		301,112	200,429
2013		402,089	338,084
2014		584,730	439,136
2015		247,649	198,855
2016		236,062	261,940
2017		434,454	361,391
2018		304,362	74,174
2019		0	0

Table 14. Hatchery contribution for adult American shad collected from the Delaware River (Smithfield Beach), the Lehigh River, and the Schuylkill River.

	Smithfield Beach		Lehigh River		Schuylkill River	
Year	N	Percent	N	Percent	N	Percent
1997	88	0.0%	No collections			
1998	234	3.8%	No collections			
1999	208	0.0%	104	91%		
2000	330	3.0%	99	91%		
2001	198	4.0%	103	92%		
2002	378	1.1%	99	89%		
2003	245	7.8%	No collections			
2004	414	1.2%	60	80%		
2005	776	0.5%	13	62%		
2006	350	1.4%	55	73%		
2007	746	2.8%	40	58%	22	92%
2008	667	1.0%	41	51%	28	100%
2009	367	1.1%	27	63%	24	96%
2010	470	0.2%	96	67%	25	100%
2011	409	0.5%	16	56%	22	88%
2012	412	1.0%	62	43%	21	84%
2013	454	0.2%	76	74%	25	84%
2014	488	1.4%	80	59%	25	88%
2015	Not Examined		62	32%	4	100%
2016	Not Examined		103	16%	29	66%
2017	Not Examined		98	14%	25	92%
2018	383	0%	49	8%	22	96%
2019	189	0%	2	50%	18	67%

Table 15. Female American shad total mortality for the Delaware River population.

Year	Z Estimate	SE	# Observations	# Year Classes	3-Yr. Moving Avg.	Z40 Benchmark
1996	0.61	0.11	**27**	3		1.07
1997	0.62	NaN	**20**	**2**		1.07
1998	0.74	0.29	56	3		1.07
2000	1.20	0.42	132	3		1.07
2001	1.61	0.12	200	3		1.07
2002	1.36	0.13	169	4	1.39	1.07
2003	1.60	0.28	219	4	1.52	1.07
2004	1.19	0.66	140	3	1.38	1.07
2005	1.63	1.65	185	4	1.47	1.07
2006	1.26	0.72	109	3	1.36	1.07
2007	1.85	0.28	232	4	1.58	1.07
2008	1.91	0.42	252	3	1.67	1.07
2009	1.44	0.21	139	3	1.73	1.07
2010	1.70	0.09	65	3	1.68	1.07
2011	3.44	NaN	290	**2**		1.07
2012	0.75	1.14	198	4		1.07
2013	1.45	0.62	261	3		1.07
2014	1.46	1.45	247	3	1.22	1.07
2015	0.87	0.18	145	3	1.26	1.07
2016	1.58	0.38	207	4	1.30	1.07
2017	1.44	0.94	144	3	1.30	1.07
2018	2.50	NaN	211	**2**		1.07
2019	0.86	1.70	166	3		1.07

Numbers in red indicate failure to meet requirements for inclusion of annual estimate and included for reference

Table 16. Juvenile non-tidal abundance indices for Delaware River American Shad. Non-tidal sites include Phillipsburg, Delaware Water Gap and Milford Beach. GLM = generalized linear model mean.

Year	Non-Tidal Shad GLM	Non-Tidal Benchmark
1988	168.44	188
1989	201.42	188
1990	308.57	188
1991	182.24	188
1992	114.26	188
1993	306.08	188
1994	224.89	188
1995	167.25	188
1996	415.6	188
1997	283.1	188
1998	53.99	188
1999	153.49	188
2000	187.71	188
2001	170.82	188
2002	80.94	188
2003	277.5	188
2004	252.2	188
2005	203.14	188
2006	55.53	188
2007	334.17	188
2008		188
2009		188
2010		188
2011		188
2012	369.14	188
2013	52.56	188
2014	162.37	188
2015	111	188
2016	157.34	188
2017	483.34	188
2018		188
2019	309.54	188

Table 17. Juvenile tidal abundance indices for Delaware River American Shad. GM = geometric mean.

Year	Tidal Shad GM	Tidal Benchmark
1987	1.68	5.81
1988	0.56	5.81
1989	9.54	5.81
1990	5.74	5.81
1991	2.49	5.81
1992	7	5.81
1993	5.68	5.81
1994	7.13	5.81
1995	5.52	5.81
1996	18.73	5.81
1997	3.05	5.81
1998	7.22	5.81
1999	7.07	5.81
2000	9.89	5.81
2001	5.45	5.81
2002	0.89	5.81
2003	9.9	5.81
2004	5.81	5.81
2005	9.26	5.81
2006	0.53	5.81
2007	15.3	5.81
2008	0.82	5.81
2009	4.21	5.81
2010	4.61	5.81
2011	8.64	5.81
2012	4	5.81
2013	27.22	5.81
2014	10.26	5.81
2015	6.9	5.81
2016	1.26	5.81
2017	14.35	5.81
2018	12.29	5.81
2019	0.79	5.81

Table 18. Delaware River spawning adult female American shad GM of the CPUE at Smithfield Beach (RM 218).

Year	Smithfield Female GM	CPUE Benchmark
1996	0.68	0.52
1997	0.76	0.52
1998	0.84	0.52
1999	0.55	0.52
2000	0.39	0.52
2001	0.48	0.52
2002	0.45	0.52
2003	0.39	0.52
2004	0.30	0.52
2005	0.65	0.52
2006	0.32	0.52
2007	0.49	0.52
2008	0.36	0.52
2009	0.21	0.52
2010	0.39	0.52
2011	1.04	0.52
2012	1.07	0.52
2013	0.70	0.52
2014	0.68	0.52
2015	0.87	0.52
2016	0.39	0.52
2017	0.66	0.52
2018	0.86	0.52
2019	0.21	0.52

Table 19. The Ratio of Delaware Stock landings divided by Smithfield female GM divided by 100.

Year	Delaware Stock Landings	Smithfield Beach GM	Ratio	Ratio Benchmark
1996	92068.5	0.68376	1346.51	799
1997	80157.5	0.75995	1054.78	799
1998	49534	0.84473	586.387	799
1999	82464	0.54728	1506.79	799
2000	87659	0.39406	2224.53	799
2001	148986	0.47733	3121.26	799
2002	43563.5	0.45463	958.217	799
2003	76471	0.39107	1955.43	799
2004	93775.5	0.29667	3160.97	799
2005	105797	0.65064	1626.05	799
2006	48339.5	0.32016	1509.83	799
2007	67133	0.49138	1366.2	799
2008	23686.5	0.36151	655.214	799
2009	8045.5	0.20673	389.178	799
2010	8619.5	0.38993	221.051	799
2011	10593.5	1.04437	101.434	799
2012	15054	1.06901	140.821	799
2013	20695.5	0.70449	293.768	799
2014	64086	0.67922	943.529	799
2015	15591.5	0.86709	179.814	799
2016	16314	0.39202	416.156	799
2017	7160.5	0.66196	108.171	799
2018	12688	0.85628	148.176	799
2019	10351.5	0.20983	493.319	799

Table 20. Total American shad landings (pounds) by state from the Delaware River and Bay assigned to mixed stock fisheries.

Year	Mixed Stock Landings	Mixed Stock Benchmark
1985	120,242	18,505
1986	130,556	18,505
1987	155,091	18,505
1988	163,651	18,505
1989	133,544	18,505
1990	318,984	18,505
1991	268,843	18,505
1992	187,907	18,505
1993	188,215	18,505
1994	123,256	18,505
1995	109,880	18,505
1996	92,069	18,505
1997	80,158	18,505
1998	49,534	18,505
1999	82,464	18,505
2000	87,659	18,505
2001	148,986	18,505
2002	43,564	18,505
2003	76,471	18,505
2004	93,776	18,505
2005	105,797	18,505
2006	48,340	18,505
2007	67,133	18,505
2008	23,687	18,505
2009	8,046	18,505
2010	8,620	18,505
2011	10,594	18,505
2012	15,054	18,505
2013	20,696	18,505
2014	64,086	18,505
2015	15,592	18,505
2016	16,314	18,505
2017	7,161	18,505
2018	12,688	18,505
2019	10,352	18,505

Atlantic States Marine Fisheries Commission

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MEMORANDUM

TO: **Shad and River Herring Management Board**

FROM: **Shad and River Herring Technical Committee**

DATE: **April 15, 2022**

SUBJECT: **TC Recommendations on updates to state habitat and fishery management plans**

The Shad and River Herring Technical Committee (TC) met via conference call and webinar on February 3 and April 8, 2022, to achieve two objectives:

1. Review State Sustainable Fishery Management Plans (SFMPs) and Shad Habitat Plans
2. Develop TC recommendations on each proposal for Board consideration

The TC recommends approval of all proposals, with the inclusion of some requested revisions. Summaries of each state's proposed changes and TC recommendations are included below.

Connecticut River Atlantic Salmon Commission (CRASC) Habitat Plan Update

Ken Sprankle presented the final draft of the updated American Shad Habitat Plan for the Connecticut River that incorporated updates from the CRASC American Shad Management Plan from 2017 and the Fish Passage Performance Addendum from 2020. The most notable threats determined by the plan are fish passage, habitat impacts from hydropower flow, an expansion of invasive *Hydrilla*, and impacts from human development. The TC recommended minor formatting changes and noted for future versions to consider requiring states to report more specific water quality parameters that cause degradation.

Merrimack River Habitat Plan for American Shad

Ben Gahagan presented the final American Shad Habitat Plan for the Merrimack River. The plan outlines numerous threats, including hydropower operations, water withdrawal, thermal discharge, water quality, and land use. However, the most significant threat is barriers to fish passage. The plan identifies seven target dams for a mix of passage improvements and removals, as well as many others that will undergo the Federal Energy Regulatory Commission (FERC) re-licensing process, and contains strategies to make significant improvements to fish passage by 2030. The TC recommended including language to define the passage standards that Massachusetts is using, which is an upstream efficiency of 80%.

New York SFMP 2022 Update

Wes Eakin presented the updated NY SFMP for River Herring, which proposed maintaining status quo for the fishery management program: a continuation of the restricted fishery in the Hudson River and moratorium in all other state waters. The main change to the SFMP is the inclusion of a new sustainability threshold for female total mortality, $Z_{40\%}$. The $Z_{40\%}$ mortality threshold was chosen as a more conservative threshold based on literature review. The stock status update showed erratic young-of-year indices but no recruitment failure, and the mortality estimates were either stable or decreasing and remained below the new sustainability target. The proposed sustainability thresholds are two consecutive years above the $Z_{40\%}$ mortality threshold or three consecutive years of recruitment failure,

which is defined as recruitment below the 25th percentile (based on recruitment from 1983-2015), and each would trigger management actions.

Delaware River Basin Cooperative SFMP for American Shad

Sheila Eyler presented the updated DE COOP SFMP for American shad, which proposed a continuation of the commercial and recreational fisheries within the jurisdiction with new benchmarks to act as more conservative management triggers. The new metrics were developed in response to the 2020 Benchmark Stock Assessment, which indicated an unsustainable mortality rate for the Delaware River stock.

The SFMP includes six benchmarks to inform management and potentially trigger action, one of which is new to this update. The new benchmark is *Female Total Mortality*, which is calculated as a three year rolling average, and will trigger management if it exceeds 1.07. The remaining five benchmarks have been updated to a more conservative level since the last SFMP.

Non-tidal and Tidal JAIs: Benchmarks are increased from 25th percentile to 50th and changed the trigger from three consecutive years below the benchmark to any three out of five years.

Smithfield Beach CPUE: The index is changed to only consider females, the benchmark is increased from 25th to 50th percentile, and the trigger is changed from three consecutive years below the benchmark to any three out of five years below the benchmark.

Ratio of Commercial Harvest to Smithfield Beach: Benchmark is decreased from 85th to 50th percentile, and the trigger is changed from three consecutive years above the benchmark to any three out of five years below the benchmark.

Mixed Stock Landings: In response to new genetic information, the demarcation line in the Delaware River to separate Delaware River stock and mixed stock was removed and 50% of all landings attributed to mixed stock. The benchmark was reduced from the 75th percentile to the 25th, and the trigger is two consecutive years above the benchmark.

The DE COOP will hold annual meetings to evaluate any triggers that were activated in the previous year and decide on management actions accordingly. The benchmarks are set to be implemented immediately, but management actions will be implemented in 2023 in order to avoid imposing new management during the fishing season.

Atlantic States Marine Fisheries Commission

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MEMORANDUM

TO: **Shad and River Herring Management Board**

FROM: **Shad and River Herring Technical Committee**

DATE: **April 15, 2022**

SUBJECT: **Technical Committee Report on American Shad Passage Prioritization**

Background

American shad stocks on the Atlantic Coast are considered at "all time low levels of abundance" based upon stock assessments completed for American shad in 2007 and 2020. These assessments demonstrate that despite significant fishery restrictions implemented under the Commission's Fishery Management Plan (FMP) for Shad and River Herring, many stocks are not showing detectable improvements.

The 2020 American Shad Stock Assessment and Peer Review Report (Assessment Report) examined shad habitat and migration barriers, and fish passage performance as of 2018 provided by Shad and River Herring Technical Committee (TC) members. Using standardized data and simulation modelling, the analysis determined that overall, dams completely or partly block nearly 40% of the total historical American Shad habitat.

In May 2021, at the TC's recommendation, the Board tasked the TC with prioritizing systems for shad recovery and developing an inventory of available data that would support development of fish passage criteria. The TC recommends that actions to reduce the negative effects of barriers and poor fish passage measures for both up and downstream migration of shad are necessary to provide increased opportunities for population recovery. Specifically, where dam removal is not possible, fish passage performance standards should be developed based on available data, fish passage modeling tools, and fish passage expertise. If the required information to develop performance standards are not available, it should be collected and/or developed for such purposes and applications.

TC Task Development

To respond to the Board task assigned in May 2021, the TC formed a task group to develop information and draft recommendations for TC review. The steps taken in the development of this task are summarized below:

- A query of FERC projects in the relicensing process or planned for relicensing was completed for the years 2020 to 2030 on East Coast river systems. Under the Federal Power Act, the USFWS and NOAA have Section 18 Fish Passage Prescription Authority, a legal tool to have FERC direct hydroproject owners to implement and evaluate passage and protection measures.
    - In addition, FERC licensed hydropower project must also obtain a Water Quality Certificate (WQC) as defined by the Federal Clean Water Act. The WQC is often

delegated by the Environmental Protection Agency (EPA) to individual State Government agencies (i.e., Massachusetts Department of Environmental Protection) or may in some case be handled by the EPA. In either case, the WQC may include specific fish passage conditions, such as passage performance standards, providing another mechanism for the States to assert their role in cooperative passage performance standards with sister state and federal agencies.

    - As the management agencies responsible for the public's fishery resources, deference is given to the agencies in the eyes of FERC, in comparison to applicant positions on these topics.

- A total of 158 FERC projects were identified from Maine to Florida based only on FERC license status/schedule.
- The TC Task Group developed a questionnaire for members to address the Board's charges:
    1) Does the system have an existing recovery plan?
    2) Does the system have existing performance standards?
    3) Does the system have existing upstream fish passage?
    4) Does the system have existing downstream fish passage?
    5) Is alosine passage needed?
    6) Any issue(s) for existing passage structures/operations?
    7) Priority?
    8) Comments
- Filtering on a TC member's designation as a "priority", noting shad as primary, the FERC project list was reduced to 34 projects (Table 1).

Results and Recommendations

For each of the projects identified as priorities, the TC recommends that the relevant state and federal agencies determine the extent to which their existing Shad Restoration or Management Plan(s) are current and relevant for information to best address upstream and downstream passage for specific goals and/or objectives. The following items should be considered for each priority project:

- If existing plan information is determined to be outdated or does not suitably address fish passage, the plan should be updated with state and federal participation with staff familiar with both Section 18 Authorities and Water Quality Certificates. Another option may be a plan addendum specific to fish passage.
- When existing plans include the commonly stated and undefined language such as "safe, timely, and effective" passage measures, steps to develop specific passage performance criteria should be discussed and developed by the agencies.
- Fish passage performance criteria development should rely on a diverse set of information for supporting rationale including but not limited to, plan goals and objectives, status and trends of population(s), existing passage information, references to other plans with passage performance criteria, research and other supporting information including the 2020 Benchmark Stock Assessment, and passage/fish

population modeling. It is the growing body of information that makes this rationale compelling for the need for better passage performance, not any single element[1].

- Performance targets should address rates of passage success that include; percent passage success for fish arriving at a project area, a time component to address delay as part of passage success, and survival rates with project passage.
- Plans should be submitted to FERC for status as Comprehensive Management Plans, requiring FERC licensee's to address these plans. One criteria for FERC consideration as a CMP is providing a public comment period.
- Development of a Fish Passage Performance Addendum to an existing Plan may be a preferred option to incorporate appropriate passage performance measures. In all instances, the document(s) should be submitted to FERC as a Comprehensive Management Plan.
- A plan that defines habitat-based area adult production, among river segments (dams), is useful for this purpose in plan goals and objectives that address, 1) fisheries, 2) ecological benefits (adults and juveniles), and 3) population (e.g., resilience, repeat spawner component).

Table 1. Summary totals for identified priority FERC Projects by state with questionnaire responses

State	# of Priority Projects	Existing Recovery Plan?	Passage Performance Standards?	U/S Passage in System?	D/S passage in system?	Is Alosine Passage Needed?	Any Issues for Existing Passage structure/ops?
Maine	8	Yes = 8	Attempting = 2 No = 6	Yes =5 No = 3	Yes = 8	Better passage = 3 Yes = 3	Yes = 7
New Hampshire	10	Yes = 7 No = 3	Yes = 7 No = 3	Yes = 3 No = 7	Yes = 3 No = 7	Yes = 10	Yes = 3
Massachusetts	3	Yes = 3	Yes = 3	Yes = 3	Yes = 3	Yes = 3	Yes = 3
Rhode Island	1	Yes = 1	Yes = 1	No = 1	No = 1	Yes = 1	No = 1
Connecticut	4	Yes = 4	No = 4	No = 4	No = 4	Yes = 4	No = 4
New York	4	Unk = 4	Unk = 4	Unk = 4	Yes = 3 Unk = 1	Unk = 4	Yes = 4
Pennsylvania	2	Yes = 2	Yes = 1 No = 1	Yes = 2	No = 2	Yes = 2	Yes = 1 No = 1
Virginia	1	Unk = 1	Unk = 1	Yes = 1	Yes = 1	Yes = 1	Yes = 1
Georgia	1	Yes = 1	No = 1	No = 1	No = 1	Yes = 1	Unk = 1
Total	34	Yes = 26 No = 3 Unk. = 5	Yes = 12 No = 15 Unk. = 5 Attempting = 2	Yes = 14 No = 16 Unk. = 4	Yes = 18 No = 15 Unk. = 1	Yes/better = 26 Unk. = 4	Yes = 19 No = 6 Unk. = 1

[1] The Connecticut River Atlantic Salmon Commission's Connecticut River American Shad Management Plan (2017) and its Fish Passage Performance Addendum (2020), help to illustrate the approaches noted here and includes the questions and responses of its public review before submittal to FERC.

Table 2. River basin locations of priority FERC projects by state

State	Priority Projects	River Systems [Tributary and/or Main Stem (#))
Maine	8	Kennebec; Androscoggin (3); Little Androscoggin, Androscoggin; Penobscot; Saco.
New Hampshire	10	Salmon Falls (3); Nashua, Merrimack; Contoocook, Merrimack (3); Piscataquog, Merrimack; Connecticut; Ashuelot, Connecticut.
Massachusetts	3	Merrimack.
Rhode Island	1	Connecticut (2).
Connecticut	4	Quinebaug (2); Moosup, Quinebaug; Housatonic.
New York	4	East; Mohawk, Hudson (3).
Pennsylvania	2	Susquehanna (2).
Virginia	1	Appomattox.
Georgia	1	Savannah.

DRAFT FOR BOARD REVIEW

REVIEW OF THE ATLANTIC STATES MARINE FISHERIES COMMISSION FISHERY MANAGEMENT PLAN FOR SHAD AND RIVER HERRING *(Alosa spp.)* FOR THE 2020 FISHING YEAR

Shad & River Herring Plan Review Team
James Boyle, Atlantic States Marine Fisheries Commission (Chair)
Michael Brown, Maine Department of Marine Resources
Mike Dionne, New Hampshire Fish and Game Department
Brian Neilan, New Jersey Division of Fish and Wildlife
Jim Page, Georgia Department of Natural Resources

May 2022

DRAFT FOR BOARD REVIEW

REVIEW OF THE ASMFC FISHERY MANAGEMENT PLAN FOR SHAD AND RIVER HERRING *(Alosa spp.)*

I. Status of the Fishery Management Plan

Date of FMP Approval:	October 1985
Amendments:	Amendment 1 (April 1999) Amendment 2 (August 2009) Amendment 3 (February 2010)
Addenda:	Technical Addendum #1 (February 2000) Addendum I (August 2002)
Management Unit:	Migratory stocks of American shad, hickory shad, alewife, and blueback herring from Maine through Florida
States With Declared Interest:	Maine through Florida, including the Potomac River Fisheries Commission (PRFC) and the District of Columbia
Active Boards/Committees:	Shad & River Herring Management Board, Advisory Panel, Technical Committee, Stock Assessment Subcommittee, Plan Review Team, Plan Development Team

The 1985 Fishery Management Plan (FMP) for Shad and River Herring was one of the first FMPs developed by the ASMFC. Amendment 1 was initiated in 1994 to require and recommend specific monitoring programs to inform future stock assessments—it was implemented in October 1998. A Technical Addendum to Amendment 1 was approved in 1999 to correct technical errors.

The Shad and River Herring Management Board (Board) initiated Addendum I in February 2002 to change the conditions for marking hatchery-reared alosines; clarify the definition and intent of *de minimis* status for the American shad fishery; and modify and clarify the fishery-independent and dependent monitoring requirements. These measures went into effect on January 1, 2003.

In May 2009, the Board approved Amendment 2 to restrict the harvest of river herring (blueback herring and alewife) due to observed declines in abundance. The Amendment prohibited commercial and recreational river herring harvest in state waters beginning January 1, 2012, unless a state or jurisdiction has a sustainable fishery management plan (SFMP) reviewed by the Technical Committee and approved by the Board. The Amendment defines a sustainable fishery as "a commercial and/or recreational fishery that will not diminish the potential future stock reproduction and recruitment." Catch and release only fisheries may be maintained in any river system without an SFMP. SFMPs have been approved by the Management Board for Maine, New Hampshire, Massachusetts, New York, and South Carolina (Table 1). Amendment 2 also required states to implement fishery-dependent and independent

monitoring programs.

In February 2010, the Board approved Amendment 3 in response to the 2007 American shad stock assessment, which found most American shad stocks at all-time lows. The Amendment requires similar management and monitoring for shad as developed in Amendment 2 (for river herring). Specifically, Amendment 3 prohibits shad commercial and recreational harvest in state waters beginning January 1, 2013, unless a state or jurisdiction has a SFMP reviewed by the Technical Committee and approved by the Board. The Amendment defines a sustainable fishery as "a commercial and/or recreational fishery that will not diminish the potential future stock reproduction and recruitment." Catch and release only fisheries may be maintained in any river system without an SFMP. SFMPs have been approved by the Board for Massachusetts, Connecticut, the Delaware River Basin Fish Cooperative (on behalf of New York, Delaware, New Jersey, and Pennsylvania), PRFC, North Carolina, South Carolina, Georgia, and Florida (Table 1). All states and jurisdictions are also required to identify local significant threats to American shad critical habitat and develop a plan for mitigation and restoration. All states and jurisdictions habitat plans have been accepted and approved.

Table 1. States/jurisdictions with approved sustainable fishery management plans (SFMPs) for river herring or shad. Includes year of original Board approval and approved updates[1].

State	River Herring SFMP	Shad SFMP
Maine	Approved (2010, 2017, 2020)	Approved (2020)
New Hampshire	Approved (2011, 2015, 2020)	
Massachusetts	Approved (2016)	Approved (2012, 2019)
Connecticut		Approved (2012, 2017)
Rhode Island		
Pennsylvania		Approved* (2012, 2017, 2020)
New York	Approved (2011, 2017)	Approved* (2012, 2017, 2020)
New Jersey		Approved* (2012, 2017, 2020)
Delaware		Approved* (2012, 2017, 2020)
PRFC		Approved (2012, 2017)
Maryland		
Virginia		
North Carolina		Approved (2012, 2017, 2020)
South Carolina	Approved (2010, 2017, 2020)	Approved (2011, 2017, 2020)
Georgia		Approved (2012, 2017, 2020)
Florida		Approved (2011, 2017, 2020)

*The Delaware River Basin Fish and Wildlife Management Co-op has a Shad SFMP, though Delaware and New Jersey are only states that have commercial fisheries. All states have recreational measures, with limited to no catch in the upper Delaware River (New York & Pennsylvania).

[1] SFMPs must be updated and re-approved by the Board every five years.

II. Status of the Stocks

While the FMP addresses four species: two river herrings (blueback herring and alewife) and two shads (American shad and hickory shad)—these are collectively referred to as shad and river herring, or SRH.

The most recent American Shad Benchmark Stock Assessment (ASMFC 2020) indicates American shad remain depleted on a coastwide basis. Multiple factors, such as overfishing, inadequate fish passage at dams, predation, pollution, water withdrawals, channelization of rivers, changing ocean conditions, and climate change are likely responsible for shad decline from historic abundance levels. Additionally, the assessment finds that shad recovery is limited by restricted access to spawning habitat. Current barriers partly or completely block 40% of historic shad spawning habitat, which may equate to a loss of more than a third of spawning adults.

Of the 23 river-specific stocks of American shad for which sufficient information was available, adult mortality was determined to be unsustainable for three stocks (Connecticut, Delaware, and Potomac) and sustainable for five stocks (Hudson, Rappahannock, York, Albemarle Sound, and Neuse). The terms “sustainable” and “unsustainable” were used instead of “not overfishing” and “overfishing” because fishing mortality cannot be separated from other components contributing to total mortality. The assessment was only able to determine abundance status for two stocks: abundance for the Hudson is depleted, and abundance for the Albemarle Sound is not overfished. For the Hudson and coastwide metapopulation, the “depleted” determination was used instead of “overfished” because the impact of fishing on American shad stocks cannot be separated from the impacts of all other factors responsible for changes in abundance.

The status of 15 additional stocks could not be determined due to data limitations, so trends in YOY and adult abundance were provided for information on abundance changes since the 2005 closure of the ocean-intercept fishery. For YOY indices, two systems experienced increasing trends while one system experienced a decreasing trend since 2005. All other systems experienced either no trend (eight systems), conflicting trends among indices (one system), or had no data (11 systems). For adult indices, four systems experienced increasing trends while no systems experienced decreasing trends since 2005. All other systems experienced either no trend (11 systems), conflicting trends among indices (seven systems), or had no data (one system). Trend analyses also indicate a continued lack of consistent increasing trends in coastwide metapopulation abundance since 2005.

Taken in total, American shad stocks do not appear to be recovering. The assessment concluded that current restoration actions need to be reviewed and new efforts need to be identified and applied. Because multiple factors are likely responsible for shad decline, the recovery of American shad will need to address multiple factors including improved monitoring, anthropogenic habitat alterations, predation by non-native predators, and exploitation by fisheries. There are no coastwide reference points for American shad. There is no stock assessment available for hickory shad.

The most recent *River Herring Benchmark Assessment Report* (ASMFC 2012) indicated that of the 24 river herring stocks for which sufficient data were available to make a conclusion, 23 were depleted relative to historic levels and one was increasing. The status of 28 additional stocks could not be determined because the time-series of available data was too short.

Estimates of coastwide abundance and fishing mortality could not be developed because of the lack of adequate data. The "depleted" determination was used instead of "overfished" because of the many factors that have contributed to the declining abundance of river herring, which include not just directed and incidental fishing, but likely also habitat issues (including dam passage, water quality, and water quantity), predation, and climate change. There are no coastwide reference points.

The river herring stock assessment was updated in 2017 (ASMFC 2017) with additional data from 2011-2015, and concluded that river herring remain depleted at near historic lows on a coastwide basis. Total mortality estimates over the final three years of the data time series (2013-2015) were generally high and exceed region-specific reference points for some rivers. However, some river systems showed positive signs of improvement. Total mortality estimates for 2 rivers fell below region-specific reference points during the final three years of the data time series. No total mortality estimates were below reference points at the end of the 2012 stock assessment data time series. Of the 54 stocks with available data, 16 experienced increasing abundance trends, 2 experienced decreasing abundance trends, 8 experienced stable abundance and 10 experienced no discernable trend in abundance over the final 10 years of the time series (2006-2015). The next river herring stock assessment is expected to be completed in 2023.

III. Status of the Fisheries

Shad and river herring formerly supported the largest and most important commercial and recreational fisheries throughout their range. Historically fishing took place in rivers (both freshwater and saltwater), estuaries, tributaries, and the ocean. Although recreational harvest data are scarce, today most harvest is believed to come from the commercial industry. Commercial landings for these species have declined dramatically from historic highs. Details on each fishery are provided below.

AMERICAN SHAD:

Total commercial landings throughout the 1950s fluctuated around eight million lbs, then declined to just over two million lbs in 1976. A period of moderate increase occurred through the mid-1980s, followed by further declines through the remainder of the time series. Since the closure of the ocean intercept fishery in 2005, landings have been substantially lower, falling below one million lbs. Since 2015, landings have remained below half a million lbs.

The total non-confidential commercial landings (directed and bycatch) reported in compliance reports from individual states and jurisdictions in 2020 were 407,179 lbs, representing a 49% increase from landings in 2019 (273,450 lbs) (Table 2). Bycatch landings accounted for approximately 25% of the total commercial landings of American shad in 2020. Landings from North Carolina, South Carolina, and Georgia accounted for 43.9%, 36.5%, and 12.4% of the

directed coastwide commercial fishery removals in 2020, respectively. The remainder of the directed landings came from Connecticut and Delaware. Maryland commercial fishermen are permitted a bycatch allowance of two fish per day of dead American shad for personal use, provided that shad are captured by gear legally deployed for the capture of other fish species; no sale is permitted. Landings from Virginia, District of Columbia, and PRFC are attributed to limited bycatch allowances for American Shad.

Substantial recreational shad fisheries occur on the Connecticut (CT and MA), Delaware (NY, PA NJ, and DE), Susquehanna (MD), Santee and Cooper (SC), and St. Johns (FL) Rivers. Shad recreational fisheries are also pursued on several other rivers in Massachusetts, District of Columbia, Virginia, North Carolina, South Carolina, and Georgia. Though shad are recreationally targeted in these locations, many fisheries are catch and release only. Hook and line shad catch levels are not well understood; actual harvest and/or effort is only estimated by a few states through annual creel surveys (e.g. Maryland, North Carolina, Georgia, and Florida). Harvest may only amount to a small portion of total catch (landings and discards), but hooking mortality could increase total recreational fishery removals substantially.

Since 2009, recreational harvest data from the Marine Recreational Information Program (MRIP) are generally not provided for American shad due to high proportional standard errors (PSEs). This is a result of the MRIP survey design, which focuses on active fishing sites along coastal and estuarine areas and is unsuitable for capturing inland harvest. However, North Carolina, South Carolina, and Florida reported American shad recreational harvest estimates for 2020 (Table 3).

HICKORY SHAD:
In 2020, North Carolina, South Carolina, and Georgia reported directed commercial hickory shad landings; Rhode Island, New York, Virginia, and North Carolina reported bycatch landings. North Carolina accounts for a vast majority of directed landings, contributing 87% of the total. Coastwide commercial and bycatch landings in 2020 totaled 92,023 lbs, representing a 36% decrease from 2019 landings (143,851 lbs) (Table 2). Virginia and North Carolina reported recreational harvest of 876 lbs and 20,967 lbs, respectively.

RIVER HERRING (BLUEBACK HERRING/ALEWIFE COMBINED):
Commercial landings of river herring declined 95% from over 13 million lbs in 1985 to about 733 thousand lbs in 2005. Recent commercial landings continue to increase, despite the closure of the ocean-intercept fishery in 2005 and North Carolina implementing a no-harvest provision for commercial and recreational fisheries of river herring in coastal waters of the state in 2007. In 2020, the coastwide directed commercial river herring landings reported in state compliance reports were 1.88 million lbs, a 25% decrease from 2019 (2.5 million lbs). Bycatch landings in 2020 totaled 24,806 lbs, a 97% decrease from the 2019 total of 720,111 lbs (Table 2). Confidential data preclude reporting commercial landings by state. New Hampshire and South Carolina provided estimates of recreational river herring harvest in 2020; recreational harvest estimates for Maine and Massachusetts are produced by MRIP but highly uncertain (Table 3).

Table 2. Shad and river herring total commercial fishery removals (directed landings and bycatch[1], in lbs) provided by states, jurisdictions and NOAA Fisheries for 2020.

	River Herring	American Shad	Hickory Shad
Maine		C	C
New Hampshire		0	0
Massachusetts		9	0
Rhode Island		0	5,362
Connecticut		21,414	0
New York		1,150	C
New Jersey		337	0
Pennsylvania		0	0
Delaware		387	0
Maryland		0	0
D.C.		0	0
PRFC		17,019	0
Virginia		3,378	1,234
North Carolina		213,724	75,182
South Carolina		111,848	C
Georgia		37,913	9,661
Florida		0	0
Total Directed	1,879,029	306,465	C
Total Bycatch	24,806	100,714	C
Total	**1,903,835**	**407,179**	**92,023**

*All values for river herring by state are not shown due to confidential data. Confidential values for American shad and hickory shad are indicated by "C."

Table 3. Recreational harvest information for river herring and American shad in 2020 from MRIP and state compliance reports.

State	River Herring Harvest	American Shad Harvest	Source of Estimates
Maine	119 fish		MRIP*
New Hampshire	26,887 fish (13,443.5 lbs)		APAIS and mandatory-reporting for net and pot fishing
Massachusetts	19,236 fish		MRIP*
North Carolina		4,621 fish (10,546 lbs)	Recreational creel surveys on the Roanoke, Tar, Neuse, and Cape Fear rivers
South Carolina	2,688 fish (1,137 lbs)		There were restrictions from COVID-19 on Fishery-Dependent Monitoring that prohibited fieldwork after March 19th, 2020.
Florida		177 fish (212kg)	Access point creel survey on St. Johns River

*MRIP estimate considered highly uncertain. Maine data has a PSE of 104.5 and Massachusetts 64.9. Spatial coverage of MRIP sampling may not align with recreational harvest areas for shad. In Maine, only 3 shad were

[1] Available information on shad and river herring bycatch varies widely by state. Estimates may not capture all bycatch removals occurring in state waters.

sampled in 2018 and fewer than 56 shad have been sampled since 1996. In Massachusetts, the estimate is based on one caught fish.

IV. Status of Research and Monitoring

Amendment 2 (2009) and Amendment 3 (2010), required fishery-independent and fishery-dependent monitoring programs for select rivers. Juvenile abundance index (JAI) surveys, annual spawning stock surveys (Table 4), and hatchery evaluations are required for specified states and jurisdictions. States are required to calculate mortality and/or survival estimates, and monitor and report data relative to landings, catch, effort, and bycatch. States must submit annual reports including all monitoring and management program requirements on or before July 1 of each year.

In addition to the mandatory monitoring requirements stipulated under Amendments 2 and 3, some states and jurisdictions continue important voluntary research initiatives for these species. For example, Massachusetts, Pennsylvania, Delaware, Maryland, District of Columbia, North Carolina, South Carolina, and the United States Fish and Wildlife Service (USFWS) are actively involved in shad restoration using hatchery-cultured fry and fingerlings. All hatchery fish are marked with oxytetracycline marks on otoliths to allow future distinction from wild fish. During 2020, several jurisdictions reared American shad, stocking a total of 14,688,667 American shad, an increase of 23% from the 11,964,361 shad stocked in 2019 (Table 5). In addition 1,268,795 river herring (both alewife and blueback) larvae were stocked in Harrison Lake, part of the James River system, in 2020.

V. Status of Management Measures

All state programs must implement commercial and recreational management measures or an alternative program approved by the Management Board (Table 1). The current status of each state's compliance with these measures is provided in the Shad and River Herring Plan Review Team Report (Table 6).

Amendment 2 (2009) prohibits river herring commercial and recreational harvest in state waters beginning January 1, 2012, unless a state or jurisdiction submits a sustainable fishery management plan and receives approval from the Board. Amendment 3 (2010) also requires the development of a SFMP for any jurisdiction maintaining a shad commercial or recreational fishery after January 1, 2013 (with the exception of catch and release recreational fisheries). States are required to update SFMPs every five years. In 2017, states reviewed their SFMPs and made changes based on fishery performance or observations (e.g., revised sustainability targets) where necessary. At a minimum, states updated data for their commercial and/or recreational fisheries and recommended the current sustainability measures be carried forward in the next plan. To date the Board has reviewed and approved updated SFMPs for all states, with the updated Massachusetts SFMP for shad being approved in February 2019.

Under Amendments 2 and 3 to the FMP, states may implement, with Board approval, alternative management programs for river herring and shad that differ from those required by the FMP. States and jurisdictions must demonstrate that the proposed management program will not contribute to overfishing of the resource or inhibit restoration of the resource. The Management Board can approve a proposed alternative management program if the state or

jurisdiction can show to the Management Board's satisfaction that the alternative proposal will have the same conservation value as the measures contained in the FMP. In August 2020, the Board approved alternative management plans for recreational fishery regulations in South Carolina, Georgia, and Florida.

Table 4. American shad and river herring passage counts at select rivers along the Atlantic coast in 2020.

State/River	Shad	River Herring
Maine		
Androscoggin	23	*
Saco	5,417	34,571
Kennebec	180	143,240
Sebasticook	109	2,847,095
Penobscot	11,233	2,074,324
St. Croix	2	611,907
New Hampshire		
Cocheco		3,832
Exeter		17
Oyster		4,655
Lamprey		56,632
Winnicut		
Massachusetts		
Merrimack	52,239	87,150
Rhode Island		
Pawcatuck	248	
Gilbert Stuart		125,196
Nonquit		94,851
Buckeye Brook		153,933
Connecticut River		
Holyoke Dam	362,244	
Pennsylvania		
Schuylkill (Fairmont Dam)	0	*
Pennsylvania/Maryland/Delaware		
Susquehanna (Conowingo)	6,413	0
Susquehanna (Holtwood)	*	*
Susquehanna (Safe Harbor)	*	*
Susquehanna (York Haven)	*	*
South Carolina		
St. Stephen Dam	275,660	15,323
Total 2020	713,520	6,252,726
Total 2019	437,853	6,543,632
Total 2018	642,688	9,404,020
Total 2017	761,386	5,876,375
Total 2016	540,917	5,514,890

*Count not completed due to impacts from COVID-19 pandemic.

Table 5. Stocking of Hatchery-Cultured Alosine Larvae (Fry) in State Waters, 2020.

State	American Shad	River Herring
Maine		
Androscoggin River	0	0
New Hampshire		
Lamprey River	0	*
Massachusetts*		
Merrimack River	0	0
Nashua River	0	0
Rhode Island		
Pawcatuck River	1,661,728	0
Pawtuxet River	0	0
Pennsylvania		
Susquehanna River	0	0
Lehigh River	0	0
Schuykill River	0	0
Delaware		
Nanticoke River	0	0
Maryland		
Choptank River	0	0
District of Columbia/PRFC**		
Potomac River	0	0
Virginia		
James River	0	0
North Carolina		
Neuse River	0	0
Roanoke River	0	0
South Carolina		
Santee	13,026,939	0
Edisto River	0	0
Wateree River	0	0
Georgia		
Altamaha River	0	0
Oconee River	0	0
Total	**14,688,667**	**0**

*In Maine and Massachusetts river herring of wild origin are stocked as adult pre-spawning individuals through trap and transfer programs. Similarly, New Hampshire stocked river herring are adults of wild origin. These are not counted toward the total because they are not of hatchery origin.

**Numbers of fry stocked from combined efforts of PRFC, DC, and MD.

VI. Prioritized Research Needs

Due to the large number of research recommendations identified during stock assessments of these alosine species, only research recommendations identified as high priority are presented below. Recommendations are categorized by the expected time frame necessary to complete the recommendation (short term vs. long term). See the most recent benchmark stock assessment of each species (2020 for American shad, 2012 for blueback herring and alewife) for additional important research recommendations.

AMERICAN SHAD

Short Term

- Otoliths should be collected as the preferred age structure. If collection of otoliths presents perceived impact to conservation of the stock, an annual subsample of paired otolith and scales (at least 100 samples if possible) should be collected to quantify error between structures.
- Error between structures, if scales are the primary age structure collected, and for spawn mark count estimates (either between multiple readers or within reader) should be quantified on an annual basis. A mean coefficient of variation (CV) of 5% and detection of no systematic bias should serve as targets for comparisons.
- Two readers should determine consensus ages and spawn mark counts based on improvements in ageing error in the Delaware system when consensus-based estimates were part of the ageing protocol.

Long Term

- Develop a centralized repository for agencies to submit and store genetic sampling data for future analysis. The Atlantic sturgeon repository at the United States Geological Survey (USGS) Leetown Science Center should serve as an example.
- Collect genetic samples from young-of-year (YOY) and returning mature adults during spawning runs for future analysis of baseline genetic population structure and site fidelity/straying rates. These data will help define stock structure, identify stock composition from genetic sampling of American shad catch in mixed-stock fisheries, and provide information on recolonization capabilities in defunct American shad systems.
- Conduct annual stock composition sampling through existing and new observer programs from all mixed-stock fisheries (bycatch and directed). Potential methods include tagging (conventional external tags or acoustic tags) of discarded catch and genetic sampling of retained and discarded catch. Mortality rates of juvenile fish in all systems remain unknown and improvement in advice from future stock assessments is not possible without this monitoring. Known fisheries include the Delaware Bay mixed-stock fishery and all fisheries operating in the Atlantic Ocean (U.S. and Canada) that encounter American shad (see Section **Error! Reference source not found.** in the stock assessment report).
- Implement fishery-independent YOY and spawning run surveys in all systems with open fisheries. Surveys should collect catch rates, length, individual weight, sex (spawning runs), and age (spawning runs) data at a minimum to allow for assessment of stocks with legal harvest. Require these surveys be in operation in systems with requested fisheries before opening fisheries.
- Conduct complete in-river catch monitoring in all systems with open fisheries. Monitoring programs should collect total catch, effort, size, individual weight, and age data at a

minimum. Require these surveys be in operation in systems with requested fisheries before opening fisheries.

- Conduct maturity studies designed to accommodate the unique challenges American shad reproductive behavior (i.e., segregating by maturity status during spawning runs) poses on traditional monitoring programs. This information will also improve understanding of selectivity by in-river fisheries and monitoring programs.
- Conduct fish passage research at barriers with adults for both upstream and downstream migration and movements and with juveniles for downstream as discussed in Section **Error! Reference source not found.** of the stock assessment report.

RIVER HERRING

Short Term

- Analyze the consequences of interactions between the offshore bycatch fishery and population trends in the rivers.
- Continue genetic analyses to determine population stock structure along the coast and enable determination of river origin of incidental catch in non-targeted ocean fisheries.
- Continue to assess current ageing techniques for river herring, using known-age fish, scales, otoliths, and spawning marks.
- Improve reporting of harvest by waterbody and gear.
- Develop and implement monitoring protocols and analyses to determine river herring population responses and targets for rivers undergoing restoration (dam removals, fishways, supplemental stocking, etc.).
- Explore the sources of and provide better estimates of incidental catch in order to reduce uncertainty in incidental catch estimates.

Long Term

- Encourage studies to quantify and improve fish passage efficiency and support the implementation of standard practices.
- Determine and quantify which stocks are impacted by mixed stock fisheries (including bycatch fisheries). Methods to be considered could include otolith microchemistry, oxytetracycline otolith marking, genetic analysis, and/or tagging.
- Validate [better estimate] the different values of natural mortality (*M*) for river herring stocks and improve methods for calculating *M*.
- Conduct biannual ageing workshops to maintain consistency and accuracy in ageing fish sampled in state programs.
- Investigate the relation between juvenile river herring production and subsequent year class strength, with emphasis on the validity of juvenile abundance indices, rates and sources of immature mortality, migratory behavior of juveniles, and life history requirements.
- Expand observer and port sampling coverage to quantify additional sources of mortality for alosine species, including bait fisheries, as well as rates of incidental catch in other fisheries.

VII. Status of Implementation of FMP Requirements

In accordance with the Shad and River Herring Fishery Management Plan, the states are required to submit an annual compliance report by July 1st of each year. The Plan Review Team

(PRT) reviewed all state reports for compliance with the mandatory measures in Amendments 2 (River Herring) and 3 (American shad). Table 6 provides important information on each state's fisheries, monitoring programs, and compliance issues pertaining to the 2019 fishing year. Table 7 summarizes state reports of protected species interactions.

De Minimis Status

A state can request *de minimis* status if commercial landings of river herring or shad are less than 1% of the coastwide commercial total. *De minimis* status exempts the state from the sub-sampling requirements for commercial and recreational catch for biological data. The following states have met the requirements and requested continued *de minimis* status in 2019:

- Maine (American shad)
- New Hampshire (American shad and river herring)
- Massachusetts (American shad)
- Georgia (river herring)
- Florida (American shad and river herring)

State Compliance

All states with a declared interest in shad and river herring management have submitted annual compliance reports. Virginia has also submitted a separate American shad bycatch report in accordance with the provisions of their limited bycatch program.

Most states have regulations in place that meet the intent of the requirements of the Interstate Fisheries Management Plan for Shad and River Herring. The PRT notes the following compliance issues encountered in their review of the state reports:

1. Several states did not report on all monitoring requirements listed under Amendments 2 and 3 (see Table 6). The primary reason for these omissions was the Covid-19 pandemic, which prevented states from conducting the required surveys.
2. South Carolina did not provide a copy or link to their current fishery regulations.
3. South Carolina, DC, and PRFC did not provide a section for law enforcement reporting.
4. New Hampshire and Connecticut did not include a section for hickory shad reporting.

VIII. PRT Recommendations

After a thorough review of the state reports, **the PRT recommends approval of the state compliance reports for the 2020 fishing year and *de minimis* requests**. In order to further streamline the compliance review process, the PRT also recommends moving section VIII B, which provides the results of hickory shad monitoring, to the appendices. This change would allow states that conduct hickory shad monitoring a place to share the results, while removing optional data from the main body of the compliance report.

Table 6. Summary of PRT Review of 2019 State Compliance Reports.

STATE	2020 FISHERY AND MONITORING HIGHLIGHTS	UNREPORTED INFORMATION AND COMPLIANCE ISSUES
MAINE	COVID-19 prevented normal operation and sampling for the month of May at the Brunswick fishway on the Androscoggin River.	Due to Covid-19 closure on Androscoggin river, no spawning stock survey or calculation of mortality and/or survival estimate was conducted. Additionally, due to the small run count on the Saco river, no mortality/survival estimate was measured to reduce sampling mortality
NEW HAMPSHIRE		Did not include a section for hickory shad reporting.
MASSACHUSETTS	In 2020, no shad were transferred to trucks for transport or removed for biological sampling and agency studies due to disruptions in operations resulting from COVID-19.	No JAI program; requirement for American shad to develop one in the Merrimack River. No mortality/survival estimates for shad or river herring due to Covid-19.
RHODE ISLAND		Samples were taken for mortality/survival estimates for river herring but mortality rates have not been updated since 2015.
CONNECTICUT		Shad: As a result of the Covid-19 pandemic, in accordance with the 2020 Holyoke fishway contingency plan, all trapping and biological sampling of American Shad were halted for the duration of the 2020 fish passage season preventing the completion of the annual spawning stock survey and drastically reduced in effort because of CT DEEP Covid-19 travel and working restrictions. Insufficient data was collected in 2020 and an abundance index could not be generated. Also no recreational FD monitoring for lack of funds and staff, so appendix has no information as well. Aside from monitoring, the progress on habitat recommendations were not ready at the time of the report, and there was no hickory shad section. River Herring: Due to COVID-19 restrictions fishery independent sampling could not be completed or effort was reduced to a point that insufficient data could be collected to generate the required indices. Did not include a section for hickory shad reporting.
NEW YORK		American shad: Calculation of mortality rates and annual spawning stock survey not completed due to COVID-19 restrictions. River herring: Spawning stock assessment, monitoring of recreational landings, and mortality estimates were not completed in 2020 due to funding and COVID-19 constraints.
NEW JERSEY	Only the January cruise of the Ocean trawl was completed in 2020 due to COVID-19. Other FI monitoring not completed.	Did not include summary of regulatory or monitoring changes for the following year. Did not report on progress in implementing habitat recommendations.
PENNSYLVANIA		No monitoring for shad or river herring because there was no sampling in 2020 due to Covid-19.

Table 6. Summary of PRT Review of 2019 State Compliance Reports.

STATE	2020 FISHERY AND MONITORING HIGHLIGHTS	UNREPORTED INFORMATION AND COMPLIANCE ISSUES
DELAWARE BASIN COOP		American shad: No recreational monitoring since 2002. Shad and river herring: Almost all monitoring was not completed due to Covid-19.
DELAWARE		Spawning stock survey for American and hickory shad not completed due to Covid-19.
MARYLAND	Fish passage mortality was lower than previous years because the Conowingo Dam East Fish Lift operated for only four days (May 12-15) in 2020. The initiation of fish passage operations was delayed due to the COVID-19 pandemic. Fish passage was suspended after May 15, 2020 to prevent upstream spread of Northern Snakehead.	
D.C.		American shad: COVID-19 work restrictions prevented the completion of a substantial amount of require fishery independent monitoring including a spawning stock survey, calculation of mortality/survival estimates, and a hatchery evaluation. River herring: COVID-19 work restriction prevented the completion of required fishery independent monitoring in 2020. Only an abbreviated JAI seine survey was conducted. No spawning stock survey, adult biological data, or mortality/survival estimates are available for 2020. Did not provide a section for law enforcement reporting.
PRFC	No hatchery evaluation was conducted because Covid-19 prevented any broodstock collections.	American shad: COVID-19 work restrictions prevented the completion of a substantial amount of required fishery independent monitoring including a spawning stock survey and calculation of mortality/survival. Did not provide a section for law enforcement reporting.
VIRGINIA	In 2020, the James River staked gillnet (river mile 10) was discontinued due to contractor health and logistical reasons. Sampling on the James River was conducted using two anchor gill nets, each 300 ft (~92 m) at river mile 36 (37° 11.0' N, 76° 42.3' W). No significant changes occurred in the York or Rappahannock rivers.	
NORTH CAROLINA		During 2020, sampling was impacted from mid-February through May due to the COVID pandemic. Sampling did not occur for the following projects with respect to American shad: North Carolina Division of Marine Fisheries (NCDMF) Albemarle Sound, Pamlico Sound and Rivers Independent Gill Net Surveys; Recreational Creel Surveys (all systems); and North Carolina Wildlife Resources Commission (NCWRC) Spawning Area Surveys (all systems). Sampling did not occur for the following projects with respect to river herring (blueback and alewife): North Carolina

Table 6. Summary of PRT Review of 2019 State Compliance Reports.

STATE	2020 FISHERY AND MONITORING HIGHLIGHTS	UNREPORTED INFORMATION AND COMPLIANCE ISSUES
		Division of Marine Fisheries (NCDMF) Albemarle Sound Independent Gill Net Survey; and North Carolina Wildlife Resources Commission (NCWRC) Spawning Area Surveys (all systems). Sampling for these programs is expected to resume in 2021.
SOUTH CAROLINA		The 2020 sampling season was preempted and cut short due to a mandatory "work from home order" from the SC Governor in response to the Covid-19 outbreak in the state. The result prohibited project biologists from performing any fieldwork for Shad or Herring after March 19th, 2020. Did not provide a section for law enforcement reporting and did not provide a copy or link to current fishery regulations.
GEORGIA	American shad: In June 2020, the Shad TC voted to approve GA's recommendation to change the management benchmark for the Savannah River from data utilizing the commercial drift-net CPUE to a fishery-independent CPUE generated from electrofishing data collected annually between February and June at the New Savannah Bluff Lock and Dam (NSBLD). This change resulted from the ongoing decline and recent absence of commercial drift-net effort in the Savannah River. This change will provide managers with a more stable and consistent dataset by which to make management decisions. Additionally, GA plans to cease conducting the juvenile seine survey in the Savannah River in 2021. This effort continues to be significantly impacted almost annually by high water levels and is considered a supplemental effort since the SCDNR conducts the juvenile electrofishing survey used in the SFMP by fishery managers. The GADNR did not conduct creel sampling on the Altamaha River in 2020 due to COVID and will not conduct creel sampling in 2021 due to internal restructuring but is planning to resume the creel survey in 2022. Hickory shad: Creel surveys on the Altamaha River were cancelled in 2020 due to COVID and will not be conducted in 2021 due to internal restructuring but are planned to resume in 2022.	
FLORIDA	2020 was the 4th year below the St. Johns River E-fish index sustainability threshold, triggering management.	

Table 7. Reported protected species interactions (sturgeon species) in shad or river herring fisheries in 2019. Only the states listed below reported interactions.

Jurisdiction	Atlantic sturgeon		Shortnose sturgeon		Unclassified		Total by State	
	Catch	Mortalities	Catch	Mortalities	Catch	Mortalities	Catch	Mortalities
RI	*						Unavailable*	Unavailable*
CT					29	0	29	0
NJ	**	**	**	**	**	**	**	**
PRFC	2	0					2	0
VA	7	0					7	0
NC	3	0					3	0
SC	2	0					2	0
GA	25	0	5	0			30	0
Total by Species	39	0	5	0	29	0	**73**	**0**

*Rhode Island reports NOAA NEFOP and ASM data, which is available after the compliance report submission deadline. Therefore, their data lags by one year. Rhode Island reported 9 sturgeon caught in their waters in 2019.

**In 2020 gill netters in New Jersey coastal waters reported discarding 2,921 lbs of sturgeon.

Atlantic States Marine Fisheries Commission

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MEMORANDUM

April 15, 2022

To: **Shad and River Herring Management Board**

From: **Tina Berger, Director of Communications**

RE: **Advisory Panel Nomination**

Please find attached a nomination to the Shad and River Herring Advisory Panel – Deborah Wilson, who has been involved in Maine fisheries and fisheries management for the past 40 years.

Please review this nomination for action at the next Board meeting.

If you have any questions, please feel free to contact me at (703) 842-0749 or tberger@asmfc.org.

Enc.

cc: Emilie Franke

SHAD & RIVER HERRING ADVISORY PANEL

Bolded names await approval by the Shad & River Herring Management Board

April 15, 2022

Maine
River Herring:
Deborah Wilson (conservation)
374 Bayview Road
Nobleboro, ME 04555
Phone: (207)380-6997
Deb.wilson1028@gmail.com

Mike Thalhauser (comm)
Alewife Harvesters of Maine
13 Atlantic Avenue
Stonington, ME 04681
207.367.2708
mthalhauser@coastalfisheries.org
Appt. Confirmed 10/30/19

Shad:
Vacancy - shad rec

New Hampshire
Shad & River Herring:
Eric Roach (rec)
54A Foggs Lane
Seabrook, NH 03874
Phone: 603.502.0928
Eroach1970@gmail.com
Appt Confirmed 2/4/21

Massachusetts
Shad & River Herring:
Mark Amorello (rec)
P.O. Box 235
Pembroke, MA 02359
Phone: 781.831.2123
markamorello@yahoo.com
Appt. Confirmed 10/30/19

River Herring:
Vacancy

Connecticut
Shad & River Herring:
2 Vacancies

New York
Shad & River Herring:
Byron Young
53 Highview Lane
Ridge, NY 11961
Phone: (631) 821-9623
Cell: (631) 294-9612
Fax: (631) 821-9623
Email: youngb53@optimum.net
Appt. Confirmed 5/5/08
Chair from 1/09- 1/11
Confirmed interest in March 2019

New Jersey
Shad:
Vacancy – recreational

Shad & River Herring:
Jeff Kaelin (comm. trawl and purse seine)
Director of Sustainability and Government Relations
Lund's Fisheries, Inc.
997 Ocean Drive
Cape May, NJ 08204
Phone: 207.266.0440
jkaelin@lundsfish.com
Appt Confirmed 8/20/09
Confirmed interest in March 2019

Pennsylvania
Vacancy

Delaware
Shad & River Herring:
Dr. Edward Hale
Delaware Sea Grant
23 Gosling Drive
Lewes, DE 19958
Phone: 302.470.3380
Ehale@udel.edu
Appt Confirmed 2/4/21

SHAD & RIVER HERRING ADVISORY PANEL

Bolded names await approval by the Shad & River Herring Management Board

April 15, 2022

Maryland
Shad & River Herring:
Vacancy - recreational

Virginia
Shad & River Herring:
Vacancy

Shad:
Vacancy

North Carolina
River Herring:
Louis Ray Brown, Jr. (rec)
212 Walnut Creek Drive
Goldsboro, NC 27534
Phone (day): (919) 778-9404
Phone (eve): (919) 778-9792
FAX: (919) 778-1197
Email: lrbrown@nc.rr.com
Appt. Confirmed 5/5/08; 8/18
Confirmed interest in March 2019

Vacancy – commercial

South Carolina
Shad:
Thomas M. Rowe, Jr. (rec)
4625 Flounder Lake Drive
Meggett, SC 29449
Phone: 843-908-0247
FAX: 843-549-7575
Email: thomasmrowe@hotmail.com
Appt Confirmed 8/3/10
Confirmed interest in Sept 2017

Vacancy – commercial net

Georgia
River Herring:
Fulton Love (dealer)
6817 Basin Road
Savannah, GA 31419
Phone: (912)925-3616
FAX: (912)925-1900
Appt. Confirmed 10/30/95
Appt. Reconfirmed 9/8/99; 3/19/08
No response to Sept 2017 or March 2019 inquiry regarding continuing interest in serving on AP

Florida
Shad & River Herring:
2 vacancies

Potomac River Fisheries Commission
River Herring:
Kevin L. Gladhill (rec)
21370 Mount Lena Road
Boonsboro, MD 21713
Phone (day): (301)988-6697
Phone (eve): (301)714-1074
Email: KLGladhill@myactv.net
Appt. Confirmed 5/5/08
No response to Sept 2017 or March 2019 inquiry regarding continuing interest in serving on AP

Vacancy – commercial pound net

District of Columbia
Shad:
Joe Fletcher (rec)
1445 Pathfinder Lane
McLean, VA 22101
Phone (day): (202)244-0461
Appt. Confirmed 10/30/95
Appt. Reconfirmed 9/15/99
Appt. Reconfirmed 4/21/08
No response to Sept 2017 inquiry regarding continuing interest in serving on AP

Nontraditional Stakeholders
Chair, Pam Lyons Gromen (fisheries conservation) (1/11)
Executive Director
Wild Oceans
1793 Sandy Court
Springboro, Ohio 45066
Phone: 240.405.6931
Email: plgromen@wildoceans.org
Appt. Confirmed 5/5/08
Confirmed interest in March 2019

ATLANTIC STATES MARINE FISHERIES COMMISSION

Advisory Panel Nomination Form

This form is designed to help nominate Advisors to the Commission's Species Advisory Panels. The information on the returned form will be provided to the Commission's relevant species management board or section. Please answer the questions in the categories (All Nominees, Commercial Fisherman, Charter/Headboat Captain, Recreational Fisherman, Dealer/Processor, or Other Interested Parties) that pertain to the nominee's experience. If the nominee fits into more than one category, answer the questions for all categories that fit the situation. **Also, please fill in the sections which pertain to All Nominees (pages 1 and 2). In addition, nominee signatures are required to verify the provided information (page 4), and Commissioner signatures are requested to verify Commissioner consensus (page 4). Please print and use a black pen.**

Form submitted by: Deborah B Wilson

(your name) State: Maine

Name of Nominee: Deborah B Wilson

Address: 374 Bayview Road

City, State, Zip: Nobleboro, ME 04555

Please provide the appropriate numbers where the nominee can be reached:

Phone (day): 207-380-6997 Phone (evening): same

FAX: _____ Email: deb.wilson1028@gmail.com

FOR ALL NOMINEES:

1. Please list, in order of preference, the Advisory Panel for which you are nominating the above person.

   1. Shad and River Herring
   2. _____
   3. _____
   4. _____

2. Has the nominee been found in violation of criminal or civil federal fishery law or regulation or convicted of any felony or crime over the last three years?

   yes_____ no__x__

3. Is the nominee a member of any fishermen's organizations or clubs?

yes ___x___ no_____

If "yes," please list them below by name.

_____ _____

Alewife Harvesters of Maine_____ _____

_____ _____

4. What kinds (species) of fish and/or shellfish has the nominee fished for during the past year?

_____ _____

_____ _____

_____ _____

5. What kinds (species) of fish and/or shellfish has the nominee fished for in the past?

_____ _____

_____ _____

_____ _____

FOR COMMERCIAL FISHERMEN:

1. How many years has the nominee been the commercial fishing business? _____ years

2. Is the nominee employed only in commercial fishing? yes_____ no_____

3. What is the predominant gear type used by the nominee?_____

4. What is the predominant geographic area fished by the nominee (i.e., inshore, offshore)?_____

FOR CHARTER/HEADBOAT CAPTAINS:

1. How long has the nominee been employed in the charter/headboat business? _____ years

2. Is the nominee employed only in the charter/headboat industry? yes _____ no_____

If "no," please list other type(s)of business(es) and/occupation(s):_____

_____

3. How many years has the nominee lived in the home port community? _____ years

If less than five years, please indicate the nominee's previous home port community.

_____

FOR RECREATIONAL FISHERMEN:

1. How long has the nominee engaged in recreational fishing? _____ years

2. Is the nominee working, or has the nominee ever worked in any area related to the fishing industry? yes _____ no

   If "yes," please explain.

_____

_____

_____

FOR SEAFOOD PROCESSORS & DEALERS:

1. How long has the nominee been employed in the business of seafood processing/dealing? _____years

2. Is the nominee employed only in the business of seafood processing/dealing?

   yes _____ no _____ If "no," please list other type(s) of business(es) and/or occupation(s):

_____

_____

_____

3. How many years has the nominee lived in the home port community? _____ years

   If less than five years, please indicate the nominee's previous home port community.

_____

FOR OTHER INTERESTED PARTIES:

1. How long has the nominee been interested in fishing and/or fisheries management? 40 years
2. Is the nominee employed in the fishing business or the field of fisheries management? yes _____ no x

   If "no," please list other type(s) of business(es) and/or occupation(s):

Fishway Construction

FOR ALL NOMINEES:
In the space provided below, please provide the Commission with any additional information which you feel would assist us in making choosing new Advisors. You may use as many pages as needed.

Pertinent to this position, I have been involved with Maine fisheries and fisheries management for the past 40 years. During the past 20 years, my principal work has been with River Herring. Here is a list of jobs and activities relevant to m participation on the Shad and River Herring Advisory Panel.

- I directed all facets of the Damariscotta Mills Fish Ladder Restoration from its inception in 2007 to its completior in 2017. Specifically, I worked with Curtis Orvis, Fishway Engineer for the US Fish and Wildlife Service, to implement his re-design of the Damariscotta Mills Fish Ladder into a pool and weir fishway. I then managed the construction of the new structure over a ten-year period with my husband, Mark Becker. In addition, I worked with a neighborhood group and wrote grants to raise all funds needed for the construction.

- In 2020 and 2021, my husband and I managed the construction of the new Bristol Mills Fish Ladder. Again, we worked with Curtis Orvis to implement his design for a new pool and weir fish ladder. This project differed from Damariscotta Mills, where the new fishway largely followed the course of the original fishway, with the addition o a plunge pool. Both projects were aimed at the passage of River Herring.

- I served on the ASMFC Advisory Panel for Shad and River Herring during the Amendment 2 process through 2019.

- I served as a Nobleboro Town Selectperson for six years, from 2008 – 2013. One role of a Nobleboro Selectperson is to oversee the alewife fishery, which I was already significantly involved with as the director of the Damariscotta Mills Fish Ladder Restoration.

- Following my two terms as selectperson, I have served on the 3-member Fish Committee for the Towns of Nobleboro and Newcastle (that jointly hold the rights to the alewife fishery at Damariscotta Mills) and I continue to serve in that capacity. The Fish Committee oversees the alewife harvest and makes decisions regarding harvesting equipment and harvesting practices.

Nominee Signature: _____ Date: 1/11/2022

Name: Deborah B Wilson
(please print)

COMMISSIONERS SIGN-OFF (not required for non-traditional stakeholders)

_____
State Director

_____
State Legislator

_____
Governor's Appointee

Signed on behalf of State delegation

Atlantic States Marine Fisheries Commission

Atlantic Menhaden Management Board

May 3, 2022
12:45 – 5:15 p.m.
Hybrid Meeting

Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary.

1. Welcome/Call to Order (*M. Bell*)	12:45 p.m.
2. Board Consent • Approval of Agenda • Approval of Proceedings from January 2022	12:45 p.m.
3. Public Comment	12:50 p.m.
4. 2021 Landings Data Update (*J. Boyle)*	1:00 p.m.
5. Consider Draft Addendum I to Amendment 3 for Public Comment (*T. Kerns*) **Action** • Review 2020 Landings Proposal	1:15 p.m.
6. Other Business/Adjourn	5:15 p.m.

The meeting will be held at The Westin Crystal City (1800 Richmond Highway, Arlington, VA; 703.486.1111) and via webinar; click here for details

MEETING OVERVIEW

Atlantic Menhaden Management Board
Tuesday, May 3, 2022
12:45 p.m. – 5:15 p.m.
Webinar

Chair: Mel Bell (SC) Assumed Chairmanship: 10/21	Technical Committee Chair: Josh Newhard (USFWS)	Law Enforcement Committee Representative: Robert Kersey (MD)
Vice Chair: Conor McManus (RI)	Advisory Panel Chair: Meghan Lapp (RI)	Previous Board Meeting: January 27, 2022
Voting Members: ME, NH, MA, RI, CT, NY, NJ, PA, DE, MD, PRFC, VA, NC, SC, GA, FL, NMFS, USFWS (18 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from January 27, 2022

3. Public Comment – At the beginning of the meeting public comment will be taken on items not on the agenda. Individuals that wish to speak at this time should use the webinar raise your hand function and the Board Chair will let you know when to speak. For agenda items that have already gone out for public hearing and/or have had a public comment period that has closed, the Board Chair may determine that additional public comment will not provide additional information. In this circumstance, the Board Chair will not allow additional public comment on an issue. For agenda items that the public has not had a chance to provide input, the Board Chair may allow limited opportunity for comment. The Board Chair has the discretion to limit the number of speakers and/or the length of each comment.

4. 2021 Landings Data Update (1:00-1:15 p.m.)

Background

- State compliance reports were due April 1, 2021
- Data was collected from the state compliance reports to update the Board in advance of the annual Fishery Management Plan Review, which is planned for the August meeting.

Presentations

- Overview of Atlantic menhaden preliminary 2021 landings data by J. Boyle (**Briefing Materials**)

5. Consider Draft Addendum I to Amendment 3 for Public Comment (1:15-5:00 p.m.) Action

Background

- In August, the Board initiated a draft addendum to consider changes to commercial allocations, the episodic event set aside (EESA) program, and the incidental catch and small-scale fisheries provision based on the Board work group report.

• The Plan Development Team (PDT) incorporated the Boards feedback from January into the Draft Addendum (**Briefing Materials**). In additional, the PDT revised their recommendations for the Board's consideration in approving the document for public comment (**Briefing Materials)**. These recommendations also include a recommendation on landings data used in the Draft Addendum. Virginia presented the PDT with a proposal that would adjust 2020 landings data to account for lost fishing days due to the Covid-19 pandemic. The PDT developed options and recommendations on what years of landings data to include in the Draft Addendum as well as possible implications for each option for Board consideration.
Presentations • Overview of Draft Addendum I to Amendment 3 by T. Kerns
Board Actions for Consideration • Approve Draft Addendum I to Amendment 3 for public comment

6. Other Business/Adjourn

Atlantic Menhaden

Activity level: High

Committee Overlap Score: High (SAS, ERP WG overlaps with American eel, striped bass, northern shrimp, Atlantic herring, horseshoe crab, weakfish)

Committee Task List
• TC,SAS, ERP WG- working on the 2022 single-species stock assessment update • TC – April 1st: Annual compliance reports due

TC Members: Josh Newhard (USFWS, Chair), Corrin Flora (NC), Joey Ballenger (SC), Jason McNamee (RI), Eddie Leonard (GA), Jeff Brust (NJ), Matt Cieri (ME), Ellen Cosby (PRFC), Micah Dean (MA), Kurt Gottschall (CT), Caitlin Craig (NY, Vice-Chair), Shanna Madsen (VMRC), Chris Swanson (FL), Ray Mroch (NMFS), Amy Schueller (NMFS), Alexei Sharov (MD), Jeff Tinsman (DE), Kristen Anstead (ASMFC), James Boyle (ASMFC)

SAS Members: Amy Schueller (NMFS, SAS Chair), Matt Cieri (ME), Micah Dean (MA), Robert Latour (VIMS), Chris Swanson (FL), Ray Mroch (NMFS), Jason McNamee (RI), Alexei Sharov (MD), Jeff Brust (NJ) Kristen Anstead (ASMFC), James Boyle (ASMFC), Joey Ballenger (SC)

ERP WG Members: Jason Boucher (NOAA), Matt Cieri (ME,ERP Chair), Michael Celestino (NJ), David Chagaris (FL), Micah Dean (MA), Rob Latour (VIMS), Jason McNamee (RI), Amy Schueller (NFMS), Alexei Sharov (MD), Howard Townsend (NFMS), Jim Uphoff (MD), Kristen Anstead (ASMFC), Katie Drew (ASMFC), Sarah Murray (ASMFC)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

ATLANTIC MENHADEN MANAGEMENT BOARD

Webinar
January 26, 2022

Draft Proceedings of the Atlantic Menhaden Management Board Webinar
January 2022

TABLE OF CONTENTS

INDEX OF MOTIONS

INDEX OF MOTIONS (continued)

Main Motion as Amended
Move to remove from draft Addendum I in Section 3.1.2:

- **Option 2: 2009-2020**
- **Option 4: Second Highest Year**

Motion carried without objection with 3 abstentions from USFWS, NOAA Fisheries, and South Carolina (Page 35).

6. **Move to eliminate sub-options 3 (weighing 75/25) to both 6a (2009-2011/2018-2020) and 6b (2009-2012/2017-2020)** (Page 35). Motion by Cheri Patterson; second by Lynn Fegley. Motion carried (Page 36).

7. **Move to eliminate sub-option 1 (weighing 25/75 to both 6a (2009-2011/2018-2020) and 6b (2009-2012/2017-2020) from section 3.1.2** (Page 37). Motion by Pat Geer; second by Craig Pugh. Motion fails (2 in favor, 13 opposed, 3 abstentions) (Page 39).

8. **Move to remove Option 5 (moving average) from section 3.1.2** (Page 39). Motion by Erika Burgess; second by Pat Geer. Motion fails (2 in favor, 13 opposed, 3 abstentions) (Page 41).

9. **Move to nominate Michael Dawson of Maine and William Caldwell of New York to the Atlantic Menhaden Advisory Panel** (Page 54). Motion by Jim Gilmore; second by Justin Davis. Motion carried (Page 54).

10. **Move to nominate Conor McManus of Rhode Island as Vice-Chair of the Atlantic Menhaden Management Board** (Page 54). Motion by Eric Reid; second by Megan Ware. Motion carried (Page 54).

11. **Move to adjourn** by consent (Page 55)

ATTENDANCE

Board Members

Megan Ware, ME, proxy for Pat Keliher (AA)
Sen. David Miramant, ME (LA)
Cheri Patterson, NH (AA)
Ritchie White, NH (GA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)
Nichola Meserve, MA, proxy for Dan McKiernan (AA)
Raymond Kane, MA (GA)
Sarah Ferrara, MA, proxy for Rep. Peake (LA)
Conor McManus, RI, proxy for Jason McNamee (AA)
David Borden, RI (GA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
Justin Davis, CT (AA)
Rob LaFrance, CT, proxy for B. Hyatt (GA)
John Maniscalco, NY, proxy for J. Gilmore (AA)
Emerson Hasbrouck, NY (GA)
Joe Cimino, NJ (AA)
Tom Fote, NJ (GA)
Kris Kuhn, PA, proxy for T. Schaeffer (AA)
Loren Lustig, PA (GA)
G. Warren Elliott, PA (LA)
John Clark, DE (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Lynn Fegley, MD, Administrative proxy
Russell Dize, MD (GA)
Allison Colden, MD, proxy for Del. Stein (LA)
Pat Geer, VA, Administrative proxy
Bryan Plumlee, VA (GA)
Chris Batsavage, NC, proxy for K. Rawls (AA)
Jerry Mannen, NC (GA)
Bill Gorham, NC, proxy for Sen. Steinburg (LA)
Mel Bell, SC (AA)
Doug Haymans, GA (AA)
Spud Woodward, GA (GA)
Erika Burgess, FL, proxy for J. McCawley (AA)
Marty Gary, PRFC
Max Appelman, NMFS
Mike Millard, USFWS

(AA = Administrative Appointee; GA = Governor Appointee; LA = Legislative Appointee)

Ex-Officio Members

Joshua Newhard, Technical Committee Chair

Staff

Bob Beal
Toni Kerns
Laura Leach
Lisa Carty
Tina Berger
Pat Campfield
Kristen Anstead
James Boyle
Katie Drew
Maya Drzewicki
Emilie Franke
Lisa Havel
Chris Jacobs
Jeff Kipp
Adam Lee
Kirby Rootes-Murdy
Sarah Murray
Caitlin Starks
Anna-Mai Svajdlenka
Deke Tompkins

Guests

Karen Abrams, NOAA
Pat Augustine, Coram, NY
Jason Avila, Avila Global
John Bello
Alan Bianchi, NC DENR
Rob Bourdon, US FWS
Jeff Brust, NJ DEP
Will Caldwell
Mike Celestino, NJ DEP
Matt Cieri, ME DMR
Heather Corbett, NJ DEP
Jessica Daher, NJ DEP
Taylor Deihl, Omega Protein
Bill Dunn
Paul Eidman
AJ Erskine
Peter Fallon, Maine Stripers
Cynthia Ferrio, NOAA
Tony Friedrich, SGA
Alexa Galvan, VMRC
Lorena de la Garza, NC DENR

Guests (continued)

Shaun Gehan, Gehan Law
Lewis Gillingham, VMRC
Angela Giuliano, MD DNR
Brendan Harrison, NJ DEP
Hannah Hart, FL FWC
Jaclyn Higgins, TRCP
Helen Takade-Heumacher, EDF
Peter Himchak, Cooke Aqua
Rich Hittinger
Carol Hoffman, NYS DEC
Jesse Hornstein, NYS DEC
Jeff Kaelin, Lund's Fisheries
Pat Keliher, ME (AA)
Adam Kenyon, VMRC
John Kollar
Jake LaBelle, WCS
Ben Landry, Omega Protein
Wilson Laney
Meghan Lapp, Seafreeze Ltd
Tom Lilly
Nick Lombardi
Brooke Lowman, VMRC
Mike Luisi, MD DNR
Chip Lynch, NOAA
Pam Lyons, Wild Oceans
Kurt Manz
Genine McClair, MD DNR
Chris McDonough, SC DNR
Dan McKiernan, MA (AA)
Jason McNamee, RI (AA)
Frank Meisel
Steve Meyers, Williamsburg, VA
Steve Minkkinen, US FWS
Chris Moore, CBF
Brandon Muffley, MAFMC
Allison Murphy, NOAA
Adam Nowalsky, Pt. Republic, NJ
Bradley O'Bier, NOAA
Derek Orner, NOAA
Willow Patten, NC DENR
Will Poston, SGA
Chad Power, NJ DEP
Jill Ramsey, VMRC
Kathy Rawls, NC (AA)
Amanda Rezek, NOAA
Harry Rickabaugh, MD DNR
Andrew Scheld, VIMS
Amy Schueller, NOAA
Tara Scott, NOAA
Alexei Sharov, MD DNR
Ethan Simpson, VMRC
Melissa Smith, ME DMR
John Sweka, US FWS
Chris Uraneck, ME DMR
Beth Versak, MD DNR
Mike Waine, ASA
Kate Wilke, TNC
Angel Willey, MD DNR
John Page Williams
Dan Zapf, NC DENR
Erik Zlokovitz, MD DNR

The Atlantic Menhaden Management Board of the Atlantic States Marine Fisheries Commission convened via webinar; Thursday, January 27, 2022, and was called to order at 8:30 a.m. by Chair Mel Bell.

CALL TO ORDER

CHAIR MEL BELL: Good morning, everybody, thanks for being here. This is the call to order of the Atlantic States Marine Fisheries Commission Atlantic Menhaden Management Board. I am going to be your Chair, Mel Bell, from South Carolina. This will be my first meeting. I will be taking the reins from our previous Chair, now Commission Chair, Spud Woodward, so big shoes to fill.

Spud left us with me with a lot of things to accomplish here. We've got a big one today that we'll get through, and get right to it. Thanks for your participation, and thanks to everybody that has kind of responded to a call for a little bit of homework ahead of time, that will hopefully be able to help us move efficiently through the major item we'll deal with today.

APPROVAL OF AGENDA

CHAIR BELL: If we get into this, let's see first of all if we go ahead and deal with things we've got to do administratively, Approval of the Agenda. Are there any desired modifications to the agenda, anything to add to the agenda? Raise your hand, remember red is raised.

MS. TONI KERNS: I have no hands.

CHAIR BELL: Okay, no hands, if there is no objection to approval of the agenda then the agenda will be considered approved by consensus.

APPROVAL OF PROCEEDINGS

CHAIR BELL: Next would be approval of the proceedings from the October, 2021 meeting. Are there any edits needed to the minutes from the October, 2021 meeting, please, raise your hand?

MS. KERNS: I have no hands.

CHAIR BELL: No hands, then we'll consider the minutes from the October, 2021 meeting approved by consensus. Thanks.

PUBLIC COMMENT

CHAIR BELL: That takes us to our first item to deal with, which would be public comment. Now remember this would be public comment for things not on the agenda. I know we've received public comment up to this point in writing.

A number of things that are related to one of the agenda items for sure, and some very recent public comment that folks may have received related to that. What I would like to do is still stick with public comment right now related to items not on the agenda, and then when we get to the particular agenda item we might be moving through, we'll try to work in public comment at an appropriate point there related to these specific items we're dealing with. That will be particularly Addendum I. If there is an interest in commenting on Addendum I, we'll work that in at an appropriate point as we're working through Addendum I, maybe after different sections that we're dealing with. That is my plan, so right now is there any interest in public comment for things not on the agenda? Raise your hand.

MS. KERNS: I have no hands at this time.

CHAIR BELL: Okay, we'll assume there is no public comment for things not on the agenda.

UPDATE ON THE 2020/2021 ATLANTIC MENHADEN MORTALITY EVENTS

CHAIR BELL: We'll move right into our first action item. Jeff Brust is going to give us an update on the 2020/2021 Atlantic Menhaden Mortality Events. This is something we had on the agenda, I believe, at the last meeting but didn't get to it. We wanted to make sure we gave it a little bit of time. We've got some time now for Jeff to make the presentation, and then we'll move along. If we

need to transfer screens or something. Jeff, if you are ready to roll with that.

MR. JEFFREY BRUST: I am, thank you, Chairman Bell. Good morning, everyone. Jeff Brust with New Jersey Marine Fisheries. As Chairman Bell said, I'll go through a quick update on some of the unusual mortality events that we are seeing the last 18 months, two years or so. Of course, we're dealing with menhaden.

We all know that mass mortality events are not uncommon for this species. The fact that they form large, dense schools makes them susceptible to environmental stressors in large numbers, and also these dense schools facilitate transmission of diseases. Some of the more common suspects in these mortality events, probably the most common is hypoxia.

This generally occurs during the summer and early fall, when the temperatures are high. It increases the metabolism of menhaden and many of the other species, and they use up the oxygen quickly. A dense school, whether it's in an embayment that has low flushing, or if they're pushed inshore from predators or things like that.

A dense school can deplete the ambient oxygen in the area, and they essentially drown themselves through lack of oxygen. One that may be a little less common but that we see in cold weather is called gas bubble disease. It's when the menhaden are acclimated to cold water, and then they enter an area that has much higher water temperatures.

Often, they'll get entrained in a cooling tower discharge, where the temperature is much higher. The oxygen is actually super saturated throughout the ambient water, and the fish aren't able to process it. What you see is they'll get gas bubbles under their skin and in their gills. The bottom picture there, it's kind of hard to see, but those bubbles that are right on its chin, those are actually under the skin.

Then one that we're all familiar with also, is what's called spinning disease. We see this throughout the region, all up through the Mid-Atlantic, New England, and even into South Atlantic. You'll see some erratic swimming behavior. The fish will be swimming in circles, hence the name. Some of the other symptoms are hemorrhaging of the eyes and the base of the fins. Some work done in the 1970s from the Chesapeake Bay, found that this could be attributed to a viral infection. This is common enough that we hear reports of it throughout the region, pretty much every year. Again, generally in the spring time. Just stepping back a couple of years in the Raritan/Hudson Region. We see fish exhibiting signs similar to spinning disease pretty much annually.

Every spring we'll get calls we've got fish swimming in circles, generally not very large events, a couple dozen fish maybe. Again, usually around the Raritan Bay, or most common around the Raritan Bay and the surrounding rivers. New Jersey's wildlife pathology and forensic lab has been sampling these fish since at least 2015.

Every year we'll go out and collect a couple of samples. We generally collaborate with several other labs. The first thing we look for is whether it's the virus associated with spinning disease. You know for the last five, six years, every sample has come back negative for the spinning disease virus, even though it's showing signs similar to the spinning disease.

Again, we see this every year in the spring time. Spring of 2020, everything seemed normal. We started getting calls March, April, small events, same area, same time of year. It wasn't a very extensive geographic range, same as always. What became unusual is later in 2020, beginning in November, we started getting calls of what were termed significant mortality events. Significant in the eyes of the public might be more than a handful of fish.

You see the photo there. There is a couple dozen there, but it's not like some of those hypoxia pictures I showed, where entire marinas were covered in fish. Significant events, similar to the one in the photo there. But what was unusual is

that this was happening in the fall. As you remember, I said spinning disease is generally common in the spring, but they were showing the same signs.

Spinning in circles, lethargic at the surface, you could pick them up with your hand, even though they're still alive. It lasted about two months, November into December. Again, it was first reported around the Raritan and the Hudson, but this one it was extending a little bit farther. Geographically we had reports into Long Island Sound, and all the way up to Rhode Island, so a little bit more unusual than we were expecting.

Wrong time of year, a bit more extreme, in terms of the geographic scope. Spring of 2021, we started seeing similar events in the spring, about the same time, but they were bigger than usual. You see the photo on the right there. That is sort of what we were seeing last spring, and again, it extended at a much larger geographic range.

We had seen it in the north of New Jersey, we had never seen it in the south of New Jersey, but we had several instances down in Delaware Bay around May. We had a suspected case up in the Northshore, Massachusetts in May, and then we even had a confirmed case up in Maine in June.

Throughout this, again New Jersey was doing some sampling. New York was also doing some sampling, coordinating with several other labs, universities, and the U.S.G.S. Signs were very similar, like I said, to spinning disease. We had hemorrhages to eyes and the bases of the fins. When we did internal investigations, there were signs of degeneration of the kidney and spleen and some of the other internal organs, and then the bottom picture there shows there is hemorrhage around the brain, and some of those fish that had hemorrhage around the brain, there was bacteria present in the tissue surrounding the brain. Again, when we did pathological studies, there was no viruses found whatsoever, including the one for spinning disease. The main culprit, it appeared, was a bacterium. It was a species of vibrio that was found in the brain regions of most of these fish. It didn't seem to be a virus, it appeared to be a vibrio species.

Beginning in 2021, we continued the sampling, and we were able to collect samples not just from New Jersey, not just from the central region where we usually see it, but from some of the other regions as well. We sampled at the beginning, the middle, and the end of the event. We were prepared for it, so we knew what we were looking for.

We were expecting it, I guess. Continued our coordination with some of these other labs. Environmental conditions seemed to be in the normal range, so it didn't appear to be hypoxia or any thermal event, as might be seen with gas bubble disease, and the pathology results were consistent with what we saw in 2020.

This was throughout the region, not just the Hudson and Raritan, but also in Delaware Bay and up in Maine. The main culprit appeared to be this Vibrio Anguillarum. There were a few secondary minor infections, but the primary suspect was this Vibrio. A little bit more about this Vibrio Anguillarum. It is naturally occurring; it is not something new.

It's common in marine and estuarine areas throughout the world. We've seen it in many species, including some that we manage here at ASMFC, including eel and striped bass, another species of concern is salmon, and mainly because of the impacts to aquaculture, when we have fish in close proximity, again, it's easy to spread diseases as well.

Some concerns with Vibrio Anguillarum in the aquaculture world. There are a handful of different strains of this critter. Depending on which strain you have, they are virulent at different temperatures. The figure on the right, the yellow bars, show the range of virulence for the different strains of vibrio.

The blue lines show the water temperatures around the center of the events, so up near the Raritan estuary. You can see for the months that we were seeing the highest number of cases, March, April,

May, and November/December. You see that the water temperatures were right smack in the middle of this virulence range for this critter. What is uncommon though is generally Vibrio Anguillarum causes systemic infection, so infection to the major internal organs in the gut.

It does not generally cause neurological symptoms in the brains and nerves, but that's where we saw most of the impacts for these 2020 and 2021 events. Mainly it was concentrated in the brain tissue. This slide is pure speculation. None of us know why it happened, but I just put together a couple of ideas for what could be causing this.

Environmental factors such as temperature, so if the fish are hanging out in waters warmer than usual in times of year that they're not there. It could be that Vibrio is always there, and the fish just happened to be there that year. Physiological factors, one of the papers I was reading about Vibrio said that many of the fish, not necessarily with menhaden, but in some lab studies that were done, many of the fish showed deficiencies in certain vitamins, minerals, things like that. If you'll remember from the last stock assessment, there has been a trend in decreasing body weight at size for menhaden, so perhaps there is some body condition factor that is playing into the higher rates of infection.

Population factors, were the schools more dense than usual? Was the population larger than usual? That might facilitate transmission of this critter. How about the distribution? Like I said, perhaps they were hanging out in areas overwinter where they don't normally hang out, which put them in close contact with Vibrio, and that's where it came from. Then there is always the possibility of it's a new strain of Anguillarum that we've never seen before, and for whatever reason it's just popped up in the menhaden population.

We know it impacts menhaden. There is, at least in New Jersey we were getting questions from the press and from the public about, what about the striped bass that I'm catching with the menhaden? What happens if I touch one of these sick menhaden? I wanted to just put it out there that there is very little concern, as far as I can tell, about other species getting impacted, including humans.

We didn't get any reports of other major kills of other species, when we were seeing the kills of menhaden. There is no known effect of wildlife predators being infected from eating infected fish. There have been a few cases of humans getting Vibrio Anguillarum from handling, but it's rare and uncommon.

Yes, the biggest concern is the effect of Anguillarum on the aquaculture industry. I just wanted to compare these events with what we normally see from other fish kills, menhaden fish kills. This was, it appeared to be a much more chronic event, rather than like a hypoxia event that would affect one embayment or one school of fish individually. This appeared to be much more chronic. There was a prolonged duration over several months over a wide geographic area.

We don't know the full extent of the mortality. We know what we saw, but there could be events that if the fish aren't visible to the public, or to researchers, it could happen and we would never know about it. Compared to hypoxia events or other events like this, none of them appeared excessive in terms of, like the number of fish that were killed at a time.

My professional, my personal opinion, based on what I know about menhaden, I'm certainly not a pathologist, but from what I've gained from our pathology lab, so what I know about Anguillarum. It doesn't appear that the effect on the overall menhaden population would be excessive. That is my personal and professional opinion.

Just to put things in perspective, the figure on the left you've seen before. This seemed to be like the worst case, you know a photo of the worst case that I saw during these events. That is a lot of fish, and could be concerning to public who aren't fully aware of the size of the menhaden population. Most of the photos that I've seen, and most of the incidents that I've seen, look more like what's on

the right there. It's still a lot of fish, but relatively speaking relative to the menhaden population, it's not that bad, and relative to say a hypoxia event, where an entire school is decimated. Staff asked me to put together, I made a statement that I don't think the impact of the menhaden population is large, but staff asked me if I could try to quantify that. That is kind of hard to do, again not knowing the full extent of the mortality, but this is a slide where I try to put things into perspective.

Speaking with our pathology lab. The folks in my lab who have gone out and seen these events, speaking to folks in New York who had seen the events in their area, estimating that several hundred thousand minimum fish were killed that we were able to see, but it was no more than a million fish that were observed throughout all the kills throughout the region.

Again, if we take into account some events that were not observed, because they were offshore, maybe there is a multiplier up to ten. Maybe we only saw 10 percent of the mortality. Outside estimate, and I consider this a very outside estimate, we might be looking at 10 million fish total that died.

I find it difficult to believe that the multiplier would be that high. At least in New Jersey many of these events were occurring when our fleet was fishing, and I think if there were large rafts of dead fish floating around out there, they would have let us know. I think that ten times multiplier is probably pretty high.

But just for the sake of argument, let's go with ten million fish cumulative throughout all of these events combined. Recall from the most recent stock assessment that the population of Age 3 plus menhaden is about 2.3 billion, and I used 3 plus, sorry I meant to mention this. We took length measurements from all our samples, and they tended to be in the range, these weren't small fish, these weren't peanut bunker, they were 2 plus, 3 plus, they were larger fish.

I'm using the 3 plus population estimate, because that is about the size that we were looking at. Ten million fish dead out of 2.3 billion fish in the population. You're looking at a mortality rate of 0.43 percent, less than half of 1 percent of mortality from these events. If you compare that to the natural mortality that we used in the stock assessment for the same age range, that is somewhere north of 0.50 percent.

The mortality rate from these events of less than half a percent compared to the natural mortality that we generally would see, associated with predation, old age, disease, all those things, everything but fishing. It's 100 times higher. Again, all in all this seems to be a very minor impact to the overall stock.

When we do these stock assessments, we estimate mortality, and then we do sensitivity around it. I think a difference of less than half a percent, we would certainly capture that when we do our sensitivity runs. Again, my personal opinion is it looked messy, it probably smelled badly after a couple of days, but overall, its impact to the population itself is going to be minor.

I will say, I didn't put a slide together for this, but the first unusual event we saw was in the fall of 2020. The spring 2021 event was larger than we had normally seen, so we were all kind of walking on pins and needles in the fall of 2021, wondering if it was going to happen again.

I'm happy to report that I am aware of only one small instance in New Jersey, a couple hundred fish maximum, and I heard from New York that they had been sampling throughout the time period, and John Maniscalco or Jesse, either one of you can correct me if I have this wrong.

But my understanding is that of all the samples that they collected, only one fish was positive for this Vibrio Anguillarum. Yes, I do want to thank Jan Lovy, our lead pathologist here in New Jersey, John Maniscalco and Jesse Hornstein, both from New York, who provided photos and info from their region. With that I will stop and take any questions, Mr. Chairman.

CHAIR BELL: All right, thanks, Jeff. Thanks for putting that together, do appreciate that very informative. I know we don't see anything on that scale down here, but occasionally when we have low DO events increase and things, it's the fish floating that people call in about. It does get attention, certainly something we need to pay attention to, especially on a larger scale.

Thank you for doing that. We've got a couple of minutes here. This wasn't an action item for us today, it's basically informational brief, but if there are Board members who would like to ask some questions, and Jeff, since you put all this together for us, we can take a few questions, and that will keep us on schedule. Does a Board member have a question, raise a hand?

MS. KERNS: All right, Mel, I will start us off. We have four hands raised; John Clark, Roy Miller, Loren Lustig, and Conor McManus.

CHAIR BELL: All right, thanks, Toni. John, go ahead.

MR. JOHN CLARK: Thanks for the great presentation, Jeff. I just want to confirm, you're saying you've only seen this in the adult bunker? I think you solved the mystery, because we've seen some of these same types of small-scale kills in late winter, early spring along Delaware Bay. We also get a lot of parasitic kills, it looks like, peanut bunker in the summer, so you've never seen this at other times of the year?

MR. BRUST: Thanks, John, good question. Again, our lab, our Marine Fisheries Lab has not been the one doing the sampling, our Fish and Wildlife Forensic and Pathology Lab has. For all of the samples that I've seen collected, relative to these kills, all of the fish were large, 250 millimeters and bigger.

Not to say that it wouldn't impact the peanuts, but we have not seen that here in New Jersey, or at least we have not sampled those here in New Jersey. I guess I can't say unequivocally that it wouldn't happen to peanuts. But that is not what we've been seeing around our region.

MR. CLARK: Thanks, Jeff, that's interesting.

MR. BRUST: If I can follow up. If you see these, and if you are able to get live fish, you know Jan has been looking for a collaboration, and he's always willing to take samples from somewhere else. If we can get some samples from you, not to speak for Jan and his work load, but we can probably figure out how to get those into our rotation of samples.

MR. CLARK: Well, that would be great, we'll keep our eyes out. Hopefully we don't see them, but if we do, we'll see if we can get some live ones. Thanks, Jeff.

CHAIR BELL: All right, Roy Miller, question.

MR. ROY W. MILLER: Yes, thank you, Mr. Chair, just to follow up a little bit. Good morning, Jeff. I was wondering if all of these events that you think were caused by Vibrio, were they pretty much open water events, they weren't confined to the lagoons where we see these large kills of peanut bunker?

MR. BRUST: That's a good question. We actually saw them; they were most prevalent in the tributaries to the Raritan Bay. We saw them on the shores of the Raritan, but a lot of them were occurring in the rivers leading into the Bay. We got quite a lot of press when the fish started floating up on the banks right behind Governor Murphy's house. Yes, they tended to be in the river, so not great flushing rates. They were not necessarily open water, but not closed lagoons and things like that.

MR. MILLER: One quick follow up, Jeff.

MR. BRUST: Sure.

MR. MILLER: With no suspicion of potentially toxic dinoflagellates or anything like that, in terms of plankton caused fish kills.

MR. BRUST: Good question. We also had our Water Monitoring Group out taking samples. I have not gotten word from them that yes, it was a dinoflagellate or anything like that. It appears to be

an internal, this Vibrio Anguillarum. There was no water quality issue that I had heard of.

CHAIR BELL: Next, I had Loren.

MR. LOREN W. LUSTIG: Yes, good morning and thank you, Mr. Chair. I thank Jeff for a very, very interesting presentation. I should take a note of a number of things that you said, Sir. I'm very happy that the fish kill is 0.43 percent, which is wonderful news. I also noted that you said they looked messy and smelled bad. I'm sure that is true.

I am interested in knowing about the relative difficulty in removing fish, in terms of time and cost from public areas, like beaches or marinas, and also, I'm interested in knowing whether the public is reasonably satisfied with what has been done, or whether there are negative editorials or a letter to the editor or that kind of thing, based on misconceptions. Thank you.

MR. BRUST: That's a very good question. Obviously, while these were occurring there was lots of media, lots of phone calls. We did, DEP, not just Marine Fisheries, but DEP as a whole worked with several townships to figure out how to clean them up. We did sort of, I can't say we mobilized our emergency response team, but certainly townships were pointed towards them, in terms of how to do the cleanup. I don't think DEP actually did any of the cleanup, we just gave guidance to the municipalities on what they should be doing. Generally, it was, wear protective clothing, just in case there might be an event of human transmission. Still, I can't speak to what the cost was or how timely it was. We were certainly getting calls saying, hey somebody needs to do something. But the higher up in the chain the decision was made that it was the municipalities' responsibility. I'm going to, if I may, Mr. Chairman, I might phone a friend, and Joe, you were more involved with those discussions than I was. I don't know if I captured that properly.

CHAIR BELL: Sure, go ahead.

MR. JOE CIMINO: That's correct, Jeff. You know it was unfortunately there is no budget within DEP to handle these types of events. Some of the politicians stepped up and found funding to help the municipalities do the cleanup, and that is kind of where it ended for us.

MR. BRUST: Thank you, Joe, just to your second question, Loren. I haven't seen any bad press that DEP didn't do what they should have. You know we get daily press updates. Every day we get the headlines for where DEP is mentioned. I haven't seen any bad press. Certainly, a lot was happening, you know a lot of articles as the events were happening, but now that the fish are gone, I haven't seen anything bad.

CHAIR BELL: Okay, thanks. Let's go ahead and take the one more question here. Conor, I think you had a question.

DR. CONOR McMANUS: Yes, thank you, Jeff, for your presentation. I was just curious from the outreach perspective, and maybe this is directed more for Commission staff. I guess I was curious if you or others had thought about constructing a consensus of information for outreach in the public for perhaps other states to use, or maybe at a minimum, is the contents from your talk today available for other states? You know in Rhode Island for example, a lot of this content would be really great as we communicate with the public and scientists for that matter, as to what we saw during these events.

MR. BRUST: Yes, good question, Conor. When these events were happening, we were getting so many press-calls we put together sort of an FAQ. It wasn't a full-blown press release, but we did make a statement and then put together an FAQ. Those are all available on our website, the New Jersey Fish and Wildlife website.

I can find those for you, and get them to Kirby or Pat Campfield actually with the Science Department was sort of spearheading communication among the different states when these were happening. I

can get our information to either Pat or Kirby to distribute to the states, for whoever wants it.

DR. McMANUS: That's great, thanks so much.

MS. KERNS: That will be great, Kirby's last day is on Friday.

MR. BRUST: I have the microphone, if I may, Mr. Chairman. I worked with Kirby. Kirby has been around a long time. I was trying to think this morning of any species that he hasn't worked on. For staff here in New Jersey, I just wanted to say one great big thank you to Kirby for all of his work over all of the years. Now I will go eat. Thank you very much, everyone.

CHAIR BELL: Thank you, Jeff, thanks for that and thanks to everybody, Jan, John and Jesse. That's interesting everybody has got a J name up there. Thanks to everybody for that. That was very informative. If anybody else has any other questions, I would just recommend. Normally I would say find Jeff in the passage way and have a discussion, but just shoot him an e-mail or something. But we're going to go ahead and move on here, in the interest of keeping on schedule.

Nice segue way into our first action item on the agenda, which is going to be moving forward with Addendum I to Amendment 3, is trying to get the document ready for public comment, for public comment the next step in the process. What we're going to spend the bulk of our time here today is working on getting that document in a form that the Board is comfortable with in moving forward to public hearing.

As you've mentioned and seen it's a rather complex document at the moment, so we've got our work cut out for us there. But I know a number of you have some good thoughts and ideas in ways we can move on that. That takes me to Kirby. Yes, so my first meeting as Chair and Kirby is leaving. Kirby has been with the Commission for, I guess about nine years, and like Jeff said, he's been such a number of different species he's done, we are definitely going to miss him. I'm really going to miss him, because I was looking forward to at least some very experienced and knowledgeable hand holding for the new Chair. But we'll make do. We want all the best for Kirby. But this will be Kirby's last meeting with us, and I'm going to shut up and let him basically work us through a process here.

What he will basically give us to breathe, a pattern I want to try to follow if he's going to work through sort of section by section, so we'll have a discussion and work through a section. We'll see if we can make progress, in terms of editing through the document, hopefully removing a number of things, because what we have right now is pretty massive.

Anything that we can remove at this point, and the Board is still comfortable with that, we would like to do that. To get this thing down to something that is a little bit more manageable for the public to comprehend, and to be able to give us some valuable feedback on. We'll basically work through it section by section.

We'll have motions associated with that section, and if this works out that there are public comments specifically related to the motions we are making with that section, we'll try to factor those in as well. That is sort of the process we'll follow. Kirby has got a great presentation here. I'm going to just let him run us through this.

But that is the idea. We would like to be able to finish today with something that the Board is comfortable with in taking to public comment. We'll see how things look as we go through, and try to take a break at an appropriate point when we need to. Kirby, I think that kind of covered it as teeing up for you. I'm going to just turn it over to you, and we'll run with it.

CONSIDER DRAFT ADDENDUM I TO AMENDMENT 3 FOR PUBLIC COMMENT

MR. KIRBY ROOTES-MURDY: Thank you, Chairman Bell, and thank you for the kind words. Yes, let's go ahead and get started. Good morning, everyone.

I'll be presenting Draft Addendum I to Amendment 3 for Board review today. This is a presentation outline. I'm going to go through an overview and timeline, then review the draft options that are in the document.

Going section by section as Mel mentioned, commercial allocation, and then episodic event set-aside, followed by incidental catch and small-scale fisheries. After going through each section, I'm going to have the PDT recommendations, and following that Meghan Lapp, our AP Chair will provide a summary of comments the AP had specific to those sections.

As Mel mentioned, we want the Board to consider removing options from the Addendum today at the end of each section, and then at the end of this agenda item, consider approval of the Draft Addendum for public comment. Just quickly, I wanted to put up on the screen so that everyone is aware of the Plan Development Team that helped put this document together.

They were incredible, they did a really great job, in my opinion, in putting this document and all the complex pieces in a succinct, clear manner. Thank you, Melissa, Micah, Nichole, Jeff, Harry, and Shanna. Just quickly, some background. As many of you remember, the Board tasked a Board workgroup to develop strategies to align commercial allocations with availability, review incidental catch and small-scale fisheries provision, and reduce quota transfers back in May of last year.

PLAN DEVELOPMENT TEAM REPORT

Over the summer that workgroup worked to put together a report, and that was presented in August, in which the workgroup outlined a number of strategies for the Board to consider in addressing these items. Based off of that report, the Plan Development Team was tasked with using this report as a starting point in developing this Draft Addendum.

As many of you remember, in October I presented a progress report memo from the Plan Development Team that identified a number of key concepts and options that the Board needed to consider and provide feedback on, to further develop the document. In terms of the timeline here that I wanted to highlight.

As you guys are aware, the plan today is to review this document and approve it for public comment. If that happens, this is what the general timeline would look coming at us in the meeting today. There would be a public comment period that would likely begin next month, possibly go through March.

Staff would be working to pull those public comments together, summarize them, and then present them back to the Board in May, at which point the Board would consider taking final action on the Addendum. Right now, the Addendum has noted at the end that the provisions would be implemented in 2023.

But if the Board wishes to change that, you know those would be considerations to be made later on, when the document is considered for final approval. In reviewing the Draft Addendum today, I'm going to provide an overview of each section by focusing on the objectives, and then the management options that are in the document. I'll have the Plan Development Team recommendations. As mentioned, Meghan Lapp will present the AP report, and will take any questions Board members have. Following that, then we'll have the Board consider motions to remove options. I will do my best to try to mirror what Emilie did so well with the striped bass presentation in October. If there is a Board motion to remove a specific option, we will strike through it, and it will be noted in red throughout the presentation, so that people can keep track.

I'll also note that in my presentation, as well as the document, we have an asterisk next to options that the Plan Development Team recommended moving. Getting into our first section, Commercial Allocation, the objective here is for allocations to be adjusted to align with recent availability of the resource, enable states to maintain current directed

fisheries with minimal interruptions during the season, reduce the need for quota transfers, and fully use the annual total allowable catch, also known as the TAC, without overage.

In this section we have two subsections, and it's important to understand that in trying to determine an allocation, there is these two steps. The first, under 3.1.1 is the allocation option for addressing the minimum allocation that each state would get. The next step in Section 3.1.2, are then the timeframes to be used to allocate the remaining portion of the TAC.

Under Step 1, we have three different options right now. Our first option is status quo, as many of you are aware that means each state gets a 0.50 percent of the TAC. Option 2 is a two-tiered fixed minimum approach, in which the states of Pennsylvania, Delaware, South Carolina, Georgia and Florida would receive a 0.01 percent of the TAC, and then the states of Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Maryland, Potomac River Fisheries Commission, Virginia and North Carolina would receive a 0.50 percent.

Option 3 is a three-tiered fixed minimum. Similar to Option 2, the first-tier states remain the same. But there is now a second tier under this option, in which the states of Connecticut, New York and North Carolina would receive a 0.25 percent, and the third-tier states of Maine, New Hampshire, Massachusetts, Rhode Island, New Jersey, Maryland and Potomac River Fisheries Commission, and Virginia would receive a 0.50 percent.

After that first step, there is allocating the remaining portion of the TAC based on different timeframes. In breaking this out into these two decision points, Option 1 provides a timeframe that is the status quo of what is laid out in Amendment 3, which is 2009 to 2011. Option 2 is to use the years of 2009 through 2020.

As many of you know, this includes both periods of high landings and low landings for a number of states, but it's important to note that it also dilutes recent trends. Option 3 is more recent years landings of 2018 through 2020. In turn this reflects more recent landings trends, stock distribution, but obviously does not contain information on landings in the past.

Now these three first options are fairly straightforward; in that they are using average landings from each of the listed timeframes. Option 4, the second highest year option, selects a best landing year for each state, using data from 2009 through 2020. The general process is that the total landings are tallied, and then determined percentages are based off of that. In turn, the percentages are not based on a given years TAC, or on the biomass that comes out of the assessment. The thought process here is that a second highest year may be less of an outlier than the highest year, and may provide states better opportunity. Option 5 is a three-year moving average that is lagged by one year. You'll see this clearly in the tables in the document that I'll go through shortly.

Option 6 is a weighted allocation approach. Whereas many of you remember during the last Board meeting there were three different weighting approaches, 25/75, that's starting with our older timeframe and newer timeframe, 50/50 evenly weighting it between the two timeframes, and then 75/25, so weighting it more heavily towards the past versus the present.

Under Option 6 there are two sub-options. Option 6A is 2009 through 2011, and 2018 through 2020. As noted, because of these different weightings, there are three sub-options for Option 6A. For Option 6B, 2009-2012, and 2017 through 2020, very similar to Option 6A, but has an additional year added on each end.

To help visually make sense of these two steps in the document, this decision tree outlines generally how each of these options would interact with each other. You would start with selecting first a minimum allocation under Step 1, and then under Step 2 is choosing the timeframe. As you can see at this level, there are a number of different combinations that come out of this process.

We'll come back to this slide later on if needed, to help demonstrate which options the Board chooses to remove would look like. I'm going to go through each of the tables now, and just to help make sure people are understanding what they are presenting. Options under Table 6, which are A1 through 4 are where the minimum allocation is 0.50 plus the timeframes that were listed earlier of status quo 2009 through 2020, 2018 through 2020, and the second highest year.

Table 7 is where the fixed minimum of 0.50 is added with the three-year moving average. You can see here that you have a three-year moving average that is lagged by one year. In the very first column with numbers, at the top you see the three years that are chosen, and then the year that would be in use. It would not be immediately after. To help you get a sense of what it could look like, for example this year, you have the years of 2018 through 2020, and that would be implemented for the year 2022. That is in the far-right column.

Next is the fixed minimum of 0.50 plus the weighted timeframe. As we walked through before, there are two different timeframes that are being looked at, 6A and 6B. Additionally, there are three weightings under each. This is our first set of tables again that have a fixed minimum of 0.50. The next sets of tables are going to be very similar to these, but they are using the tiered approaches.

I'm going to go through those a little bit more quickly. Again, you can follow along with these tables in the document. Table 9 is a two-tiered minimum with Options 1 through 4. Next is the two-tiered minimum with the moving average, and then next is the two-tiered minimum with the weighted timeframe. Then the last three tables I'm going to go through are the three-tiered minimum. Three-tier minimum with the four options as noted. Table 12, three-tiered minimum with the moving average in Table 13, and then the three-tiered minimum with the weighted timeframe. Again, this is on Table 14. Please, be sure to reference this in your materials that were sent out to the Board earlier this month. Next are the Plan Development Team recommendations for this section. The Plan Development Team recommends removing the following timeframe options. First Option 2. As noted, this is the longest timeframe and given that it dilutes some of the trends that can be picked up by looking at either more recent year's landings, as well as considering some of the options under the weighted approach.

Option 4, as noted in my presentation, the second highest year option is being recommended to be removed. Because of the complexity, as well as that it's not using for any given state's allocation the TAC for that year, and a biomass that comes out of the assessment. The last option that the PDT is recommending be removed from this section is the weighted allocation timeframe # 2.

Largely because this seems to be accomplished through the other option 6A, and having three sub-options under two different weighting timeframes kind of creates more options that the Board and the public will have to choose from, when many of them may be very similar. Those are the Plan Development Team recommendations. Next is the AP report, and as mentioned before, our AP Chair will walk the group through these summary points.

ADVISORY PANEL REPORT

MS. MEGHAN LAPP: Thanks, Kirby. This is Meghan Lapp, the AP Chair. As the AP discussed the options that Kirby just ran over, they expressed support for considering adding an explicit option that allows additional quota percentage from a tiered approach to be put back into the state allocations, rather than just increasing the episodic event.

They also recommended to adjust the statement of the problem to note states that have worked within their quota since 2013. Also, adding an option for research set-aside quota, similar to the episodic event, but specifically for research set-aside itself. They also expressed concern for the second highest year option.

There was some discussion over that, which is a point, AP members were not aware of any other management plan that uses the second highest

year, and staff is not aware of any management plan that does that either, so there was concern about that option.

MR. ROOTES-MURDY: Thank you, Meghan. We'll move on to questions now for either items that I presented that are in the Addendum, or regarding Plan Development Team recommendations or the AP report.

CHAIR BELL: All right, thanks, Kirby, questions from the Board so far. You can see how these things have multiple factors and they play off of each other. You can see how it gets rather complex. Just let me know what kind of hands you have raised.

MS. KERNS: I will give you three at a time, so the first three are John Clark, Chris Batsavage, and Justin Davis.

CHAIR BELL: All righty, John Clark, go ahead.

MR. CLARK: Thank you for the great presentation, Kirby. I'm just curious, as a state that would be in a very small quota here. Did the PDT consider coming up with a de minimis option for states that either don't fish at all for menhaden? You know if our goal is to minimize the amount of quota that goes unused, why is quota being allocated to states like Pennsylvania, South Carolina, Georgia?

If we had a de minimis option that would probably take care of that you wouldn't have to do this. That was my first part, and then just curious as to how the decisions were made as to either round up or round down states to put them into the tiers they were put in?

CHAIR BELL: Thank you, John, Kirby, do you want to take a shot at that?

MR. ROOTES-MURDY: Yes, thanks for the question, John. We really went off of the guidance from the Board during the last Board meeting, and I don't recall there being a request for a specific de minimis option, where those states as you listed would not have an allocation. I will just remind the Board that we are still at a stage where if there is an interest in that being pursued, that could be added into this document.

I would recommend though, if that is of interest that definitely to consider removing other options. In terms of how the landings information is considered. I will note that outside of our status quo option of A1, again which is the fixed minimum and the timeframe. We're using the most up to date landings information, and so we have a calculation that we've used to come up with that.

I could walk people through that in more detail, but we tried to mirror as much as possible the kind of allocation approach from Amendment 3 that we rounded to, the nearest hundredth in that regard, and that is the simplest way to get into it at this point. But I can provide more detail later if needed.

MR. CLARK: Thanks, Kirby.

CHAIR BELL: I've been focusing on removing things, removing things. Keep in mind, I mean in the process of tweaking this that someone feels very strongly about adding something, fine. But as Kirby mentioned, if we're going to add something, you really need to think about what else you might remove. Again, it's a balancing act with this thing, you touch one piece and it affects something else. Okay, Chris.

MR. CHRIS BATSAVAGE: Thank you for the presentation, Kirby. You might have mentioned this in your presentation, but I just want to make sure I understand correctly regarding Amendment 3 that Amendment 3 required that the Board review the allocations after three years. If that's the case, will that three-year review still be part of this after final action is taken on Addendum I? I'm asking just to kind of get a better perspective as far as regarding any options we might want to remove, as far as allocations go.

MR. ROOTES-MURDY: Yes, thanks for the question, Chris. That has generally been the approach the Plan Development Team has been working under. If need be, we can make that more clear or explicit in the document that once the Board were to approve

this document with new allocations, that they would be revisited within three years if not sooner. But that was the general premise this group was working under.

CHAIR BELL: Justin Davis.

DR. JUSTIN DAVIS: I think this is a question for Kirby. I'm wondering about the feasibility of adding in a sub-option under 3.1.1. I get this is going contrary to the general goal today of taking things out of the document. But I'm hoping this might sort of clarify that there is a decision point here, that I don't think is really explicit in the document, and that is what to do if the Board were to ultimately select Options 2 or 3 under 3.1.1.

One of the tiered minimum approaches, what to do with the quota that is freed up by selecting one of those options. You know under status quo 8 percent of the quota is taken up by minimum allocations. Under Option 2 that would drop to 5.5 percent, under Option 3 it would be 4.8. It's sort of implicit, because the next section 3.1.2 is about how to allocate the remaining TAC.

It sort of says, unless some other decision is made that quota that is freed up is going to get allocated back out, according to whatever formula is selected there. Then it is mentioned down in 3.2.1 that, well you know we could use some of that quota that is freed up to increase the episodic set-aside.

It also occurs to me, down at 3.3.4 we're talking about catch accounting for incidental catch in small-scale fisheries. Option 3 talks about creating a 1 percent set-aside of the TAC to accommodate landings under that program. It seems like that's also a potential use for this quota freed up by Option 2 or 3.

I'm wondering if we added in a sub-option conditional on Options 2 or 3, that essentially would create a decision point for what does the Board want to do with the quota that's freed up, if we select Option 2 or 3. That might help sort of clarify to the public that there is a decision point there, and how that quota might be used.

If we were to do that, could we like would we need a motion today to add that to the document? Could we do it by Board consent? Would we have to go back to the drawing board to the PDT and add it in to bring the document back? I'm just sort of curious about the process for potentially adding that in.

MR. ROOTES-MURDY: Yes, thanks for the question, Justin. It's a fair one, because this is where we have these sections interact with other sections, right? Later on in the document we have this note about the episodic event set-aside with Option 2 increasing it to 5 percent, and if that's of interest to the Board then effectively this additional quota that could be freed up could be used in that, or a certain amount of it.

I think one thing that I would like to make as clear as I can at this point. The allocations that are drawn up in this first section. That decision point of how to use that additional percentages from the tiered approach, doesn't affect what the state's allocation percentage is. It would affect what the poundage is. That is where I think we can actually make it clearer that it's a decision point for the Board, and if you would want it to be an explicit option, you know that's fair. I can understand that being more helpful to communicate to the public. But it's just important to keep in mind that what would be adjusted is the poundage, and not the state percentages, if that makes sense.

CHAIR BELL: Hey Justin, good question, and you touched on something, just sort of the interdependence of all these pieces on each other, and moving one direction and how does it affect this or that. But I think that is certainly a valid point that you made. As Kirby said, we can kind of try to deal with that at the appropriate point.

Again, don't read, I mean my saying is remove, remove. If we need to adjust or as Justin just mentioned, clarify some things or add things that would be constructive, in terms of helping the public understand and us visualize how this whole machine will work once it's all up and running. That's fine. We can certainly do that. Just kind of

moving along here, got any other hands at this point?

MS. KERNS: I have a couple, I have Nichola Meserve, actually and Roy Miller.

CHAIR BELL: Okay, Nichola, go ahead.

MS. NICHOLA MESERVE: I agree with Justin that some additional clarity is needed on the point that he raised about the TAC that is saved with the other tiered approaches. I believe that when the work group talked about that, we thought that the most, you know kind of transparent, easiest approach was to have that go back into the TAC as a whole, as opposed to into any particular set-aside.

That is my recollection, if anyone else wants to correct it, please do. But I had raised my hand because I wanted to ask about the three-tiered fixed minimum approach, and kind of specifically what was the criteria that was used to put Connecticut, New York and North Carolina into the 0.25 percent tier?

When I look at the Table 2 in the document that shows the state's landings as a percentage of the coastwide landings. You know New York kind of jumped out at me as maybe a different level than Connecticut and North Carolina, particularly if you look at 2020, when they were over 1 percent of the coastwide landings.

I just was hoping for some clarity as to how the PDT put those three states in the middle tier, and also to clarify that the states would be in these tiers until another addendum modified it. For example, there is no moving in between the tiers outside of an addendum process.

CHAIR BELL: Thanks, Nichola, Kirby do you want to add to that?

MR. ROOTES-MURDY: Yes, I'll go ahead. As noted in the document under this option, depending on the timeframe in Step 2 that's selected. The understanding was that for nearly every year between 2009 and 2020, those states would likely have sufficient quota to cover their landings every year. That was the general thought process, was to see which states could fall into that kind of category of the two combinations of putting them in a lower minimum than what Amendment 3 outlined, and then outside of the status quo what could get them to a higher quota level, or maintain them at a quota level that would allow them to cover their landings in most years, based off of the data we were looking at.

In terms of the second question regarding those being fixed in this Addendum. That's the idea that the Plan Development Team was operating under, that these allocations would be set from these two decision points, until a subsequent addendum were to be undertaken to adjust those allocations moving forward.

MS. MESERVE: Thanks, Kirby.

CHAIR BELL: I figure we're going to keep going back to this decision tree that's useful just keeping us straight. Toni, I can't remember who you had next.

MS. KERNS: No worries, Mr. Chair, it was Roy Miller, and Ritchie White also has his hand up now.

CHAIR BELL: Roy, go ahead.

MR. MILLER: I wanted, since Nichola brought it up I would like to go back to Table 2 again. I'm looking at the Tier 1 allocations for the states of Pennsylvania, Delaware, South Carolina, Georgia and Florida. In Table 2 it doesn't provide any guidance on South Carolina and Georgia, because apparently their landings during the calm years in that Table 2 were confidential.

Pennsylvania's were presumably zero during those particular years. But Delaware's landings were 0.02 to 0.04, and Florida's landings were 0.05 to 0.07. What I don't understand is, why are we setting up a Tier 1, a first-tier criteria of 0.01 percent, which would put Delaware and Florida behind already? If this becomes acted upon, and Delaware and Florida, for instance, only receive an initial allocation of 0.01 percent.

Then clearly if history repeats itself, we'll be in the process of searching for quota elsewhere every single year. Why don't we make the Tier 1 criteria something that would satisfy Delaware's and Florida's recent needs? I was just thinking off the top of my head something like 0.1 percent. Maybe that would accommodate Georgia and South Carolina too. But that is my question, Mr. Chair, and if that is viewed favorably, I might have a motion at some point.

CHAIR BELL: All right, Roy, thanks for that.

MR. ROOTES-MURDY: Just to help with Roy in understanding the thought process here. The table he's referring to, I don't have it in my presentation, but it's in the document, and you've all seen it a couple times. Table 2 shows what each state percentage is of the coastwide landings, based off of total landings data. As he mentioned, you know Delaware in that table is 0.02 in 2019 and 0.04 in 2020. Florida is 0.05 and 0.06. Again. 0.02, 0.04, 0.05, 0.06. As you can see in Table 6 in the document, and in terms of the slide number, Maya, if you want to pull that up that would be Slide 12. What you can see there is that that fixed minimum still allows those states to have an actual allocation that is much higher than that. It would cover their landings, and they would not need to pursue quota transfers, I think to your concern. As noted in Table 18, the tiering actually aligns them up with what those historical periods were, in T2 and T3.

That's the case for both the 3 tier and the 2 tier. There was consideration made to that for the states that may have lower landings compared to other states. But if there is an interest in changing this in the document, as mentioned before, we can obviously accommodate that today through a motion.

MR. MILLER: Follow up, Mr. Chair?
CHAIR BELL: Sure, go ahead.

MR. MILLER: Kirby, I had assumed that under the proposal the 0.50 would be done away with. Instead, your proposed amount would be in Tier 1, would be the total. But what you're saying is, it's assumed that the 0.50 will be retained, and the Tier 1 proposals just get added to that. Is that what you're saying?

MR. ROOTES-MURDY: Sorry, so that we're fully clear. Table 6 outlines how the allocations would break out if the 0.50 percent is retained. If you move down to the tiered approaches, so Table 9 for example through 11, and then again 12 through 13, the fixed minimum that those first-tier states get is lower than that. Again, it does line up, at least for the states you mentioned, with those timeframes that were mentioned in Table 2. But it's not a 0.50 for those states in the tiered approach.

CHAIR BELL: Within the document right now there is an option that holds things at 0.50 as you pointed out. But then there is also an option available to take that down to 0.01 or 0.05 for the states that we were talking about. All right, Ritchie White.

MR. G. RITCHIE WHITE: I'm thinking about the complexity of this and how the public will view this in their decision-making process. I'm thinking about if there is a way of showing each individual thoughts on each table to show which meets the goals and objectives for each individual state.

When I look at this there are very few of these that would meet New Hampshire's goals and objectives, and I think that's pretty much true for Massachusetts and Maine, I believe. I was wondering if there is a way of showing that, have those shaded in or some other way, so the public will have an easier time going right to the options that are going to fulfill the needs of their individual state.

CHAIR BELL: All right, Kirby, any thoughts?

MR. ROOTES-MURDY: Yes. Thank you for the question, Ritchie. The key thing is, what do you mean by that? What is it that is going to meet the needs of the state? Is it assessed percentage, and if so, what is that based on? Is it a certain timeframe landing? Again, specificity on what you would like to have in this document to clearly indicate a way to guide the public to options that make sense or are

more applicable, based on what they would like to see for their state would be helpful.

MR. WHITE: Follow up, Mr. Chair.

CHAIR BELL: Go ahead.

MR. WHITE: Yes, I think that the three New England states, I believe, are going to be looking for what they've been harvesting in the last three years. That is the need, and really, I think a lot of states would be looking at or saying that their needs are eyond that. This is an upward trend, and I know New Hampshire harvested a fair amount more in 2021 than we did in the previous three years.

I believe Maine is in that situation, I'm not positive. The public is going to be looking at how many pounds will be in our quota, and how does that compare with the last three years, and they are going to view that as their need. They would take that from the goals and objectives, trying to solve that problem that New England has a larger abundance, and capacity to harvest that, and the need for it for bait.

CHAIR BELL: I think I follow you, and basically from the public's perspective is that here has been our world for the past three years, this is what's going on in terms of harvest. Which option here seems to allow us to deal with, just to maintain that or deal with the future? But I think I understand what you were getting at there. I'm not sure how, it seems like you might have to add a whole other table, or multiple tables, I'm not sure. But I followed the point you're making. It makes sense from the public's perspective.

MS. KERNS: Mr. Chair, if I may interject here. I think what we could do as staff, perhaps I might need to think this through a little bit more. But I think we could highlight or mark or star options for each state that, this is tricky. You know the quota changes in any given year, so it's hard to say in the affirmative.

But we could use a, I guess an old year's, a previous year's quota or the current year quota to say, this allocation option would be at or above the average of that state's landings for the last three years. But I don't think we can say it meets the goals of that state. That would be something that a state could say at its public hearings.

But that would almost be like saying, this is the preferred option for each of the states in the management document, and that's not something that the Commission specifically does. To have to point out at each individual states preferred management options, I think would be a little bit confusing in the document.

CHAIR BELL: Yes, I agree, Toni.

MS. KERNS: I do, in thinking about this, I am a little concerned if we don't lose any alternatives or very many alternatives, as the document stands right now, as Kirby said before, there are 33 options. To try to indicate which options are above a certain amount could be additionally confusing in the document. We would have to think through how we might be able to achieve that. I just wanted to let you know that we now have Lynn, Erika, David Borden and Craig Pugh on your list.

CHAIR BELL: All right, Lynn, go ahead.

MS. LYNN FEGLEY: I just want to thank Kirby for the presentation, and while I have the microphone, all of his work over the years. We're going to miss you. I just wanted to weigh in a little bit on Roy's comment, and also on Ritchie White's comment. I think the Board needs to really think hard about simplifying this.

In my mind this three-tiered option is sort of doing arbitrary backflips to create a very small amount of extra quota to move around. It seems like under the two-tier option from the tables, Delaware would be mostly covered, and I want to stress that there is this incidental small-scale fishery provision, that if that stays in the document and it's open for public debate, would cover states like Delaware, if there was a case when they didn't quite have the TAC, the quota to meet their needs. By the way, that also holds true for Maryland.

I also want to be careful a little bit about this idea that every state is going to get what it needs. I get that. The reality is we're allocating a limited resource. Every state is likely to not get what they need. I think because that's true, you know if Maryland gets a slug of fish through the Bay again like in 2012, when we harvested 13 million pounds. We're not going to get what we need.

I mean we're not going to get what we need, but I would like to think that there is a simpler overarching way, and it's probably through some of these, you know the bycatch provision and the incidental catch, and considering fish distribution the way it is now, so we consider how the fish are distributed and we consider that this distribution is going to shift. We probably don't need to be worried about trying to develop tiers and place states in categories, and I may make a motion about that later if I get the chance, so thank you for the opportunity to speak.

CHAIR BELL: Good point. We're saying it's the public, I think it was kind of a matter of public perception in what they need. I follow your point. You don't always get what you need dividing a finite resource here that varies from year to year, which is kind of a public perception piece to that. Erika.

MS. ERIKA BURGESS: Lynn said most of my thoughts more eloquently than I can. In reading this document I struggle with how the Board would build a rationale for many of these options, simplifying it down would certainly be my preferred. As we can see, we have a hard time tracking across the different options and sub-options where we are.

That is illustrated by the conversation where we were talking about the tiered option and Table 6 was pulled up, and it's the 0.50 percent option, not the tiered option. We can't even follow the conversation with the slides that are presented before us today, so I am fully supportive of streamlining the options here.

CHAIR BELL: Toni, I had to change pens after Erika, so who were the other two you had?

MS. KERNS: No worries, and I've got another one on the list anyway. David Borden, Craig Pugh, and Pat Geer, and Erika, your microphone is still opened FYI.

CHAIR BELL: All right, so David, if you want to go ahead and weigh in.

MR. DAVID V. BORDEN: Yes, I share the Board Chair's concern about the level of complexity in the document. I think we've got to make more of an effort to focus on alternative ways of simplifying this, because I think it's going to be almost impossible for some members of the public to fully digest the nuances, and advantages and disadvantages of different strategies. I would like to go back to John Clark's suggestion about de minimis, which I thought was kind of intriguing.

In the lobster plan, I just point out to everybody, in the lobster plan we have a provision that exempts certain states, in this case Mid-Atlantic and South Atlantic states. I think all of the states in the management unit south of New Jersey, from a landing restriction and some of the monitoring restriction, and it's all based on a poundage. Unless they land over a certain poundage, they have to comply with the monitoring requirements.

If we were to employ a strategy like that and set the number right, we could basically take a couple of these options out of the document, and possibly lessen the administrative burden on some of the states with small catches, and still incorporate it into the document by having whatever they catch up to that value be deducted from the quota, either in that year or the following year. John's suggestion I think is a good one that we probably ought to explore, and it's kind of an elegant way to eliminate some of these options.

CHAIR BELL: Good point. Craig.

MR. CRAIG D. PUGH: I would also like to echo John Clark's ideas. I think we need to look a little more into this. I can see that the 0.01 will impact our blue crab fishery considerably with a lot lower allocation. It will put our menhaden fishery itself

back into a bycatch radical mode, where we were able to eliminate that under the old allocation that we had.

You are kind of thrusting us back into a problem that we were able to alleviate in the past five, six years, back when we met in Baltimore. The impacts will impact our greatest fishery, which is our blue crab fishery. It's basically the only fishery we have that is viable in the state, and that may end up taking that away. It would impact us greatly without some additional work to this. I can't help but feel that putting this forward to us this way our needs were not considered. I find it a little bit offensive in that regard.

CHAIR BELL: What I'm going to do is, I've got Pat on here for a question. I would like to go ahead and let Pat weigh in, Pat Geer, and then I would like to start to focus us on getting to some motions. I think we're at that point, where if there are motions that people want to make pertinent to what we're doing here. That would be helpful, and maybe kind of actually put pen to paper, so to speak. I'll tell you what also. We'll let Pat have a question, and then maybe we'll take a quick bio break, and then we can come back and deal with motion type stuff. Pat, if you want to go ahead and weigh in here.

MR. PAT GEER: It's not a question, it's more of a comment. I'm not going to be as eloquent as some of the other folks, and Robert Boyles, who quoted Jefferson and Franklin. But I will quote Mick Jagger who said, you can't always get what you want, but if you work really hard, you'll get what you need.

This is going to be a situation where you're not going to get everything you want here. We have to have compromise. We can't look at just what happened in recent years, we have to look at historical values as well. I agree with what everybody said, we can't keep adding more options to this and looking at other things if we want to complete this today. What we need to do is we need to look at these options and decide what could be removed, and what needs to stay.

If we can't do that then we're pretty much at a point where we're not going to finish this task for the day, and we'll have to do it at another meeting. I urge us to start looking at these options and discussing which ones we can remove to make this document a little bit easy for the public to digest. I've already gotten a lot of complaints from the public saying that this is just too complex, we don't understand it. I'm all for taking a break and coming back, and start looking at what we can remove from these options.

CHAIR BELL: All right, Pat, thanks for weighing in on that, and I concur. Kirby, is that a good approach? Let's take ten, and then folks come back, and then we kind of go into, let's try to actually make something happen mode, related to dealing with motions. Does that sound good, Kirby?

MR. ROOTES-MURDY: Yes, I think a short break for biological needs, and then coming back and hearing motions is a good approach.

CHAIR BELL: All right, I've got 10:03, why don't we be back in seven minutes. Let's try to shoot for 10:10. I'm sorry, you've got the clock up there. Go ahead and take the full 10, I'm sorry. Thank you, folks.

(Whereupon a recess was taken.)

CHAIR BELL: All right that's ten minutes. Thanks for your patience. We had a lot of good discussion this morning. I think the discussion, you could tell from the comments just how complex this is, so it's not a simple thing. We're going to try to get this thing in a condition that we're comfortable with to take to public comment. We've got some work to do.

With that I'll turn it back to Kirby to kind of try to re-center us here. But I think the idea now is let's try to turn some of this into some actual action through motions, and throw some things on the board to see what sticks. Kirby, if you want to go ahead and get us back on track.

MR. ROOTES-MURDY: Yes, thank you, Chairman Bell. I just want to remind folks, there was I think

some focus in our last conversation about the landing's information in Table 2. It's just a reminder that really what we want people to be focusing on are these tables that are combined Step 1 and Step 2 allocations. That's Table 6 through Table 14 in the document. I think that the Plan Development Team has taken a lot of time to think through those, and make sure that there is some level of allocation for every state, so keep that in mind. I think we should move into motions now.

CHAIR BELL: All righty, and just so you know what all is going behind the scenes here. This is the problem with a virtual meeting is I'm having to communicate via cell on two different levels, and then I've got the screen here. But I know we have a number of motions that people have been very helpful in sending us.

Kirby kind of has the master list of motions and things that people have sent in. I think, in terms of what we've received right now that it might be good to introduce. I think Kirby, you indicated maybe one from Lynn would be a good place to start, if Lynn is willing to do that.

MS. FEGLEY: Mr. Chairman, I am willing to do that. If you say go, I will put something on the board.

CHAIR BELL: Yes, Ma'am, let's throw something on the board.

MS. FEGLEY: Go ahead and see what sticks, yes, let's see how well done this pasta is. If I may, Mr. Chair, after I make this, I would like to provide a little rationale, given the comments that we've heard. **I would move to remove Action 3, the three-tiered fixed minimum approach under 3.1.1, options for addressing minimum allocation.**

MS. KERNS: You have a second by Emerson Hasbrouck.

CHAIR BELL: Okay, thank you, Emerson.

MR. EMERSON C. HASBROUCK: Yes, I'll second that.

CHAIR BELL: We've got a motion and a second. Lynn, do you want to go ahead and explain a little bit?

MS. FEGLEY: Yes, I'll try to be brief. I really did make my point earlier. I think that this option is, it's a little bit of an arbitrary mechanism that places states in categories. As soon as you place states in categories, those defining lines shift. Somebody is going to want to switch which category they're in, and to Nichola's point earlier about not being able to move categories without another addendum.

It's just setting us up for a lot of complication. I fully understand Delaware's concern. I think looking at the tables, it does seem as though the two remaining options on the board, either the two tier or the 0.50. Either one of those two options would cover Delaware in most years. I want to just go back and stress the idea of simplification. But there is still the option for the incidental catch and the small-scale fishery provision, which would cover Delaware, and also Maryland, because Maryland is not in a very different situation than Delaware is with this. With that, I just want to remind, as to the de minimis option. I think we need to be really careful about adding new options to this document right now, after the amount of discussion that we've had. I think that the incidental catch provision would essentially accomplish the same end as the de minimis, with the difference that the incidental catch has the ability to fall under the accountability options that we'll discuss later, and de minimis would not. That's it, I'll stop there, Mr. Chair, and thank you very much.

CHAIR BELL: Thank you for that explanation, Lynn, and thank you for the motion. Discussion of the motion, hands.

MS. KERNS: I have Emerson Hasbrouck.

CHAIR BELL: Okay, Emerson.

MR. HASBROUCK: I was going to talk in support of the motion, obviously since I seconded it. But I don't have anything to add from what Lynn just

mentioned. She said it quite eloquently, so I'm good with Lynn's reasoning to support this.

CHAIR BELL: Great, thanks for that backup there. Any discussion, any other opinions?

MS. KERNS: Two other hands, John Clark followed by Nichola Meserve.

CHAIR BELL: Okay, John, go ahead.

MR. CLARK: I fully appreciate Lynn's points there, but if the purpose of this whole Addendum is to better allocate the catch. I mean we have certain options here. I think the three-tiered one actually gets closer to a base for what most states are catching, and then when you add on the Step 2, which I don't think, you know it was hard enough for me to understand the Step 2.

I get the feeling that you know even on the Board there is some confusion about that. I'm sure the public will be truthfully confused by that. You know I think like even our state would be able to get by with, depending on what option is chosen in Step 2, but I do think that the 0.25 is more parsimonious in how it allocates the total allowable catch, so I don't see any need to remove that at this point.

CHAIR BELL: All right, Nichola.

MS. MESERVE: I really agree with John Clark's statements about keeping the three-tiered approach and the intent of these options. You know if we're only left with a two-tiered approach, you know Delaware and Florida are still in that 0.01 percent tier that we've spent the last 20 minutes talking about.

I was thinking along different lines of keeping the third option, the three-tiered approach, but moving Delaware and Florida, because they do have history of landings that are more similar to Connecticut's, for example, which is in the second tier, and moving Delaware and Florida into the second tier, so that the three states with no landings are Pennsylvania, South Carolina and Georgia are the only states in that 0.01 percent tier. I think I'll wait for a little bit more discussion on this motion, before potentially suggesting a substitute that would do that instead.

CHAIR BELL: All right, thanks, Nichola. We've heard a couple in favor, a couple not so much in favor, further discussion.

MS. KERNS: One other hand is raised, Pat Geer.

CHAIR BELL: Okay, Pat.

MR. GEER: Given what I just said about trying to reduce this, I'm going to have to say, this is the easy part. You know having the three tiers, I would support keeping those. The numbers were not arbitrary in Option 3, they were a mathematical calculation. I think this is something the public will understand. It's when we get to this next step, Step 2 that I think we need to start cutting options out. I would support keeping all three options in.

CHAIR BELL: All right, support for keeping all three. Any other perspectives on this?

MS. KERNS: Cheri Patterson.

CHAIR BELL: Go ahead, Cheri.

MS. CHERI PATTERSON: I agree with Pat. I think that we need to bring to the public all of these three options, and have them continue to help pare this down from the public's perspective.

CHAIR BELL: All right, thanks, Cheri. Anything else on this? We've got some for, some against and some want to keep everything at this point, realizing it's not what they want to cut. Any other thoughts?

MS. KERNS: We have Roy Miller.

CHAIR BELL: Roy, go ahead.

MR. MILLER: I would just like to say that I like Nichola's suggestion of moving Connecticut and Delaware into Tier 2 of the three-tier approach, if this motion gets voted down. I think that

accommodates Delaware's concerns regarding being in Tier 1.

CHAIR BELL: All right, thanks, Roy. Anything else on the motion?

MS. KERNS: No additional hands.

CHAIR BELL: Okay, so we have a motion. We've had a little bit of discussion, some for, some not so much. Discussion of an alternative motion. What is the pleasure of the Board? Is there a desire for an alternative, or just vote on it?

MS. KERNS: I have Justin Davis followed by Nichola Meserve.

CHAIR BELL: Okay, Justin.

DR. DAVIS: I just wanted to request perhaps like a one-minute caucus before we vote on the motion.

CHAIR BELL: Oh yes, I'm alone in my kitchen, but yes, I understand. We'll have to do that obviously. Nichola.

MS. MESERVE: I just wanted to state that if this motion fails, I will put forward a motion that would modify the option to change the tier for Delaware and Florida, just so people know that when they're thinking about this motion. Thank you.

CHAIR BELL: Got you.

MS. KERNS: I think you can vote, Mr. Chairman.

CHAIR BELL: All right, why don't we go ahead and have a, what do you need a minute, a two minute? Take a minute if you can do it in a minute. We'll have a caucus, those than can caucus.

MS. KERNS: Mr. Chair, if after that minute a state needs more caucus time, they can raise their hand and I will let you know.

CHAIR BELL: Yes, no problem. Just kind of dealing with the system we're working in here.

MS. KERNS: Mr. Chair, your minute is up, and I don't see any hands raised saying they need more time.

CHAIR BELL: All right then, pretty sure we're not going to have consensus on this. The best way to do this, you go state by state. Is that what you do, Toni?

MS. KERNS: If you just ask the states to raise their hands for or against, then I'll just call them out.

CHAIR BELL: Well yes, let's do that. The hand raise feature. All in favor of the motion, raise your hand. One hand for each state.

MS. KERNS: I'm just going to give a second for the hands to settle. I have New York, Maryland and Potomac River Fisheries Commission. I will put your hands down. I am ready.

CHAIR BELL: Thank you, all opposed.

MS. KERNS: I'm going to let the hands settle for a second. I have Rhode Island, New Jersey, Florida, Connecticut, Massachusetts, Georgia, Maine, Pennsylvania, Delaware, North Carolina, Virginia and New Hampshire. I will put your hands down.

CHAIR BELL: All right, any null votes or abstentions? Toni, I have a question. I'm actually by myself, so I'm the Chair, would I be an abstention?

MS. KERNS: Mel, it's up to you as Chairman. If you want to vote you can, but you don't have to.

CHAIR BELL: Yes, I'll just abstain right now.

MS. KERNS: I will note that. Could you just make it clear if you're asking for abstentions or null votes right now?

CHAIR BELL: Yes, any abstentions, that would be me.

MS. KERNS: We have South Carolina, NOAA, and Fish and Wildlife Service.

CHAIR BELL: Okay, thank you, any null votes?

MS. KERNS: No null votes.

CHAIR BELL: **Okay, thank you. All righty, and that motion fails.** I believe Nichola had an alternative idea, perhaps.

MS. MESERVE: Thank you, Mr. Chair. I would move to modify Section 3.1.1, Option 3, to put Delaware and Florida in Tier 2 (0.25%).

CHAIR BELL: All right does that look clear?

MS. MESERVE: That looks good, thank you.

CHAIR BELL: We have a motion, Modify Section 3.1.1, Option 3, to put Delaware and Florida in Tier (0.25%). Is there a second?

MS. KERNS: We have a second by Erika Burgess.

CHAIR BELL: Okay, Erika, thank you.

MR. ROOTES-MURDY: Mr. Chair, just wanted to note for the record that the vote count there were 3 in favor for the last vote, 12 against, and 3 abstentions.

CHAIR BELL: Thanks, Kirby. All right, discussion of the motion.

MS. KERNS: You have Nichola, Erika and Jesse Hornstein.

CHAIR BELL: Nichola, go ahead.

MS. MESERVE: My hand was left up, but as rationale, you know I think we've had a pretty robust discussion about this, and I think putting Delaware and Florida in this tier more closely aligns with their landings, and will avoid more reliance on the incidental catch provision, by putting them into this tier.

CHAIR BELL: All right, thanks for that and then Erika.

MS. BURGESS: I wanted to add some more rationale to this. If you look at Table 2 for Florida's landings compared to some of the states that would be in Tier 3 or Tier 2. In most years in Florida, our landings are a larger percentage of the coastwide landings, there are just several outlier years that bumped these other states into the upper tiers, so I appreciate this motion.

CHAIR BELL: Was it Jesse you had next?

MR. JAMES J. GILMORE: It's actually Jim Gilmore, Jesse signed on, I'm technologically challenged. Let me make a couple of comments on this, and I want to make sure I understand this right. The justification for Delaware and Florida to go up into Tier 2, is because based upon their landings the Tier 1 would be insufficient.

If that is correct, then I would make the same argument for New York, based upon our landings the last few years. We've exceeded 0.50 percent, in terms of our landings, and we're currently in Tier 2 at 0.25. If that's what is going to be the theme for this, then I would consider making a motion to amend, then put New York into Tier 3. Is that the idea behind this that we're trying to match our actual landings with which tier we would be in? If that is correct, Mr. Chairman, please come back to me, and I would like to make an amended motion.

CHAIR BELL: Okay, thanks, Jim. I think the idea was to have to adjust the tier, and retain, we haven't gotten rid of anything, we're still retaining the different options. Within the options, I guess there would still be, we've got different scenarios covered. Nichola, you made the motion, would you like to comment on that?

MS. MESERVE: Yes, I think, partially Jim's rationale is the rationale for this motion, as well as the fact that there is this distinction between Pennsylvania, South Carolina and Georgia, with zero landings, and with given the opportunity for the three-tier approach. You know I think that those three states alone should fall in the lowest tier, which by default puts Delaware and Florida up into the next tier.

CHAIR BELL: Right, that's what I was thinking. Jim, does that answer the question?

MR. GILMORE: Let me still understand it. We were putting Delaware and Florida into Tier 2, because essentially it more reflects their landings, and then we would stay in Tier 2, but we would hopefully get at the end of this an increase that we would get above the 0.50 percent we needed. Wouldn't it be the same argument that if Florida and Delaware were at Tier 1, that after the end results come out, they would be able to get something closer to 0.25 like their landings. It just seems to be we're arguing two different things. It can either fix it later on or you can fix it now. But depending upon which tier you're in, it is sort of inconsistent is really the trouble I'm having right now.

CHAIR BELL: Okay, I understand, I flip back and forth and follow this myself, but I agree that South Carolina and Georgia and Pennsylvania are kind of unique, in terms of where they land, and how we approach that, as far as a tier goes, but sort of a solution here. We can entertain a modification, an amendment to the motion, or an alternative motion, or we can vote on this. What is your pleasure?

MR. GILMORE: Mr. Chairman, if I may. Let me ask another question. Are there other states that are similar to New York's situation that they are currently in Tier 2, but at the end of the process here that they would rather be, you know essentially, it's what is at Tier 3, or is New York just unique in that?

CHAIR BELL: Does anybody got anything on that?

MS. KERNS: Mr. Chair, it's hard for me to tell, but I'm going to go in my list here, and I have Lynn, then Roy, then Emerson.

CHAIR BELL: Okay, Lynn, Roy, Emerson. Go ahead, Lynn.

MS. FEGLEY: I mean this is kind of the issue, right. This is where it all starts. I just want to, I mean I really appreciate this conversation, and I'm never one to sneezes at fish, but you know I think we're talking about, under the current TAC, something like 3 million pounds of fish, which is a lot, but it isn't a whole lot in the grand scheme of things.

Maybe what it sounds like is happening here, is that we actually just need two tiers. We need the one tier for Georgia, and South Carolina and Pennsylvania, and the second tier for the other states who do harvest fish, and it's equitable. Because it just concerns me that once we start playing with the three tiers, it's already a problem. I would put that out there for consideration, and I'll stop there.

CHAIR BELL: I appreciate that, and yes. I think that we have a new situation with three states. Yes, that is how we got into these different tiers. Roy, do you have something?

MR. MILLER: Just quickly, I want to express support and appreciation to Nichola for the motion. I would definitely support it, because it alleviates Delaware and Florida's obvious problem. I would just add that I wouldn't oppose Jim Gilmore's suggestion either for New York state. But I hear what Lynn is saying, and I'm appreciative of the attempt to simplify things. I'm worried that we're going to get wrapped around the axle a little bit. I think we know where we want to go, it's just a matter of how do we word it to get there?

CHAIR BELL: Emerson, you have something?

MR. HASBROUCK: Yes, thank you, Mr. Chairman. Some of the problem with our caucus being in different locations, it's difficult for us to directly talk to each other. I thought Jim was going to make a motion to substitute, or to amend rather. **He didn't make that, so I'm going to make a motion to amend. That would be to also move New York into Tier 3.**

CHAIR BELL: All right, we have a motion to amend to move New York into Tier 3, is there a second to that?

MS. KERNS: Here we go, Roy Miller.

CHAIR BELL: Okay, Roy Miller is seconding that. Discussion of the amended.

MS. KERNS: Jim Gilmore.

CHAIR BELL: Jim.

MR. GILMORE: Yes. Emerson was right. I was going to wait until the discussion for the motion. I obviously support this. Again, it's just making it consistent, if we're trying to match actual landings and things with what tier slot. I think it makes sense, so I obviously support the motion.

CHAIR BELL: Further discussion of the amendment, motion to amend?

MS. KERNS: You have Nichola Meserve.

CHAIR BELL: Okay, Nichola.

MS. MESERVE: Just wanted to quickly say that I support this, and considered asking Erika if she would agree to it as a friendly amendment to the initial motion, but my first comment today was kind of inquiring about how New York ended up in the second tier, so I definitely can support this amendment, thank you.

CHAIR BELL: Okay, thank you. Support for the motion to amend, any turn of opinion?

MS. KERNS: One hand, Pat Geer.

CHAIR BELL: Pat.

MR. GEER: I'm not opposed to this. I sympathize with the states, and I understand that Delaware and Florida, they have had a fishery where Pennsylvania, South Carolina, Georgia, really haven't. I understand Jim Gilmore's point as well. My concern is, if we make these changes, all of our decisions afterwards, we no longer have the information available to use any more. The information in the document is no longer valid. It's not valid anymore because we've made changes. How are we going to proceed after that point?

CHAIR BELL: Yes, I follow you. We've made something like that, then it completely, all the analyses are all off, and everything would have to be redone, I believe. Kirby, is that correct?

MR. ROOTES-MURDY: Yes, I didn't want to sway people's opinion on the vote, but it's important for people to understand that you know with these changes, I understand in the motion. That we would need, the Plan Development Team would need to go back and obviously revise the table to reflect this.

They need to double-check the math, and I think equally important the Board would really need to make sure that they understand what those new percentages would look like for allocation. We can't on the fly today put that together and ensure that it's correct. It would need some more finessing time, unfortunately.

CHAIR BELL: Okay, yes, good point, Pat, in terms of a little reality here. Then the Board needs to decide, I guess, in terms of importance if we were to kind of go this route. I understand the rationale for it. It's trying to end up with the best document we can. But it does what we need it to do. But to go that route then we're definitely not going to be in a position to move on the timetable that we had envisioned. I guess that's something to think about. Any thoughts on that from anyone?

MR. ROOTES-MURDY: Mr. Chair, if I can, just really quick. I want to note for folks that it would alter the timeline that I have on and that I presented earlier that was on the screen. But I do want to note, that in terms of the implementation of this document, it might not make a difference.

There is still the intent or interest in wanting this to be implemented for the 2023 fishing season, then whether the Board takes final action on this document in May or August, or between May and August. I think that can still, that goal if that is the top priority, can still be achieved.

CHAIR BELL: Okay, and that's good to know. That is sort of the bottom line, I guess, some people may

be hoping for. I guess we need to ask ourselves then, if this is really something that would improve the document, improve our approach. You know, do you want to go ahead and invest some time in doing this. It sounds like from what Kirby said you have a chance, perhaps at staying on the implementation schedule. That's just something for folks to think about. Any other points upon the discussion of the motion to amend?

MS. KERNS: You have Megan Ware, Nichola Meserve and Erika Burgess.

CHAIR BELL: Megan, go ahead.

MS. MEGAN WARE: Yes, and I appreciate Virginia's point here. I will say, I think these are fairly minor changes to some of the percentages in the tables we've seen, so I'm still prepared today to make motions on some of the allocation options, and I hope other Board members are as well. Whether we approve it for public comment or not, I think is still to be determined. But I still hope we can have discussions on some of the allocation options, to get that more streamlined.

CHAIR BELL: I agree with you, Megan. Okay, Nichola.

MS. MESERVE: You know even if these motions pass, I would still hope that the Board would be in a position to consider approving this document for public comment. You know I'm thinking about striped bass. There was an option added yesterday that hasn't been fully written into the document, and that document was approved for public comment. I think these are more minor changes that I trust the PDT to make in a document, and still have it be approved today.

CHAIR BELL: Erika.

MS. BURGESS: I would agree with Megan, that I think there are still decisions we can make today with the remaining steps for the allocation decisions that there are concepts in here that we can talk about as concepts, even if we don't have hard percentages.

CHAIR BELL: Got you, thank you, good point. All right, let's go ahead.

MS. KERNS: Lastly, you have Lynn Fegley, sorry.

CHAIR BELL: Okay, go ahead, Lynn.

MS. FEGLEY: Just real briefly. I just want to take a quick moment to make sure we really thank the Plan Development Team and for the work that they did, put together an incredibly complicated document. I would just put a plea out to the Board to consider them as well, you know as we're walking through this. We've got to do what's best for us, I realize that, but this is a Herculean effort, so let's just sort of keep them in mind as we go.

CHAIR BELL: Very good point, Lynn, yes. The people behind the scenes that are making the train run, in some respects. Okay, so let's go ahead and let's fully clear up what we've got here. We have a motion to amend. Let's go ahead and deal with that. Let's see, well we'll try. Are there any objections to the motion to amend? Just raise your hand.

MS. KERNS: No hands are raised in objection.

CHAIR BELL: Okay, so then no hands, so then the motion to amend passes. The modified version becomes the main motion.

MS. KERNS: Yes, and if you just give Maya a second to combine those two motions, she will do that.

MR. ROOTES-MURDY: I would just also add, to make sure that it's clear what the Tier 3 is for New York, since we have it explicit for Delaware and Florida. The Tier in terms of the percentage is 0.50.

MS. KERNS: If you could read that motion into the record, Mr. Chair that would be great.

CHAIR BELL: All right, so now the motion we will be working on is move to modify Section 3.1.1, Option 3, to put Delaware and Florida in Tier 2 (0.25%), and move New York into Tier 3 (0.50%). That's the motion. Does anybody need to caucus on that?

MS. KERNS: I see no hands raised for caucus.

CHAIR BELL: All right, then let's try this. Is there any objection to the motion?

MS. KERNS: I see no hands raised. Hold on, there is one hand, Pat Geer, is that an objection?

CHAIR BELL: Go ahead, Pat.

MR. GEER: Yes, it is. I mean like I said, I'm not opposed to this, but I am opposed to approving this and then moving forward with this document, without seeing the updated numbers.

CHAIR BELL: All right, so do we need to, since we do have one objection, can we just go ahead.

MS. KERNS: And vote, yes.
CHAIR BELL: Do you need to get everybody to vote then?

MS. KERNS: I believe that's what we should do.

CHAIR BELL: I think so. Okay, then everyone in favor of the motion, go ahead and raise your hand.

MS. KERNS: Letting the hands settle. I have Rhode Island, New Jersey, New York, Florida, Connecticut, Massachusetts, Georgia, Maine, Pennsylvania, Delaware, North Carolina, Maryland, New Hampshire, New York, and Potomac River Fisheries Commission. I will clear the deck for everyone. I'm ready.

CHAIR BELL: All opposed to the motion.

MS. KERNS: Virginia. I'll clear the deck.

CHAIR BELL: Abstentions.

MS. KERNS: NOAA, Fish and Wildlife Service, and South Carolina.

CHAIR BELL: All right, null votes. Well, we didn't caucus.

MS. KERNS: No null votes, at this point anyway.

CHAIR BELL: Then that motion passes. Well, that's a lot of time invested in getting to one motion. But thank you, I mean it's very important to do this right. Kirby.

MR. ROOTES-MURDY: Making sure, just for the record, those in favor, it was 15 votes, against with 1 vote, and 3 abstained.

CHAIR BELL: All right, thanks for that. Then in terms of moving forward, Kirby, have we got any other motions that people have already submitted that might be worth moving with?

MR. ROOTES-MURDY: Yes, my suggestion would be, if there are any additional motions folks had to Section 3.1.1, and if not, we can move on to any motions folks have for Section 3.1.2.

CHAIR BELL: Anything else for 3.1.1, in terms of motions that you thought about or may have already submitted for consideration? Any hands?

MS. KERNS: I don't have hands. One hand, Justin Davis.

CHAIR BELL: Okay, Justin.

DR. DAVIS: I just wanted to make a quick comment relative to my comments earlier about potentially adding in a sub-option to clarify the decision point about how to allocate any quota freed up by the tiered minimum approaches. I just wanted to state that I actually don't now think that is necessary, you know given that it's actually apparent when thinking about it.

You know any set-aside for the episodic events program, or for minimum allocation all happens upstream of allocation out to the state under 3.1.2. Sort of by default any fish we free up with the tiered minimum approaches are first available to the episodic set-aside, or any other set-aside we create.

I think it would help in the document to maybe clarify that, at the end of Section 3.1.1 that essentially any quota freed up by adopting one of

the tiered minimum approaches, you know is going to by default be allocated according to 3.1.2, unless some other option in the document is selected to create some set-aside so they could take advantage of that freed up quota. I think that might just be helpful in clearing up to the public what's going on there, because I have heard some comments from the public that they're not clear on what's happening there.

CHAIR BELL: Okay, thanks for that clarification, Justin, and I guess that is sort of direction to staff to just consider some verbiage in there to help clarify a little bit to the public.

MR. ROOTES-MURDY: Yes, thanks, Mr. Chair, we have that noted. That will be modified in the document.

CHAIR BELL: Well, if there is nothing else on 3.1.1.

MS. KERNS: I have one hand. Sorry, Mel. Allison Colden has her hand up.

CHAIR BELL: Allison, go ahead.

MS. ALLISON COLDEN: I've been debating all morning whether I should hold this comment for later, but it directly relates to Justin's comment just now, and that is, I have the same question requesting the same clarification, or the addition of a sub-option under EESA, where the PDT recommended that it is an option the Board could consider to make the freed-up quota part of the EESA.

I wasn't sure if we could bring that up now, or if it's going to be added as an explicit option under this section, or if were, if it would be appropriate to add it as an exclusive option under the EESA section. I guess I just want to flag that I had the same concern, and I think that there are multipole places it could go. At this point I'm not sure how exactly we could attack that.

CHAIR BELL: Kirby, you have a sense of the best approach for there, in terms of how, maybe it's just a matter of further clarification in the document for explanation?

MR. ROOTES-MURDY: Yes. The Plan Development Team thought about this a little bit, and my read right now is it probably would make sense for this to be taken up, if you want to add it as an option in the episodic section. Because as noted, that doesn't affect what the percentages the states get, it just affects what the poundage is. I think that would be the most appropriate place for it.

CHAIR BELL: Okay, so we'll revisit that when we get to that episodic. All right, anything else in 3.1.1?

MS. KERNS: Rob LaFrance.

CHAIR BELL: Okay, Rob.

MR. ROBERT LaFRANCE: I want to also express my great thanks to Kirby for the wonderful work he's done on the Commission. It's been a pleasure working with him. Just in terms of talking about the clarification. It might be really helpful, once we redo these numbers, to show for each one of the different options just what the percentage would be.

That for example, we change a little bit how, you know we went from 0.50 to 0.1, and we had numbers in between. It would just be helpful, I think, with clarifying how much percentage of the overall TAC is now relieved, if you will, in each one of them. I see this up here, for example, like under the two-tiered approach what does that get us versus Option 1.

What does it get us versus Option 3, just as a percentage? If for example, there is 8 percent if everybody, I think 8 percent of the minimum allocations is what we get at 0.50. What would those numbers be under Option 2 and Option 3? I just think that will help the public understand how much we're talking about in terms of the overall TAC.

CHAIR BELL: Yes, and at the percentage base. Kirby, is that something again we can address by simply explaining things in a little bit more detail?

MR. ROOTES-MURDY: Yes, absolutely. We'll have that noted to make that change, and maybe Rob can follow up with us and the staff. I want to make sure we capture that to his satisfaction.

CHAIR BELL: Thanks Rob, good point. All right, nothing else on 3.1.1, we can move on to 3.1.2, related to now we're into, I guess that is Step 2, which we're discussing the timeframe issues. Do we have any motions related to any possible changes or deletions of things under 3.1.2?

MS. KERNS: Megan Ware.

CHAIR BELL: Megan.

MS. WARE: I have sent in a motion to staff, and the motion is to remove the three options that were starred by the PDT for removal, so that's move to remove from Draft Addendum I in Section 3.1.2, Option 2, 2009-2020, Option 4, second highest year, Option 6B, weighted allocation timeframe 6B (2009-2012, and 2017-2020). If I get a second, I can provide some rationale.

CHAIR BELL: Okay, can we get a second to that motion?

MS. KERNS: John Clark.

CHAIR BELL: John Clark, thank you, go ahead, Megan.

MS. WARE: I'm trying to help the PDT and the public out here by taking a lot of these options out that I just don't think are totally viable, and to speak to each of these. Option 2, the document notes that the 2009-2020 timeframe may not reduce the need for transfers or reliance of states on the episodic events program or small-scale provision. I just don't see this option aligning with the objectives of the addendum. Option 4, I think people know that I had been the one advocating, at least for the concept of this idea. I think in reality what the numbers show is that this option serves 15 out of 16 states very well, but unfortunately one state, that state being Virginia, takes the brunt of that reduction. I think we can take this one out. Then Option 6B is one of the weighted allocation options. As Kirby mentioned, these produce a lot of iteration, so I do think it's prudent to pick one. I prefer the 2009-2011 and 2018-2020 option, because I think it really clearly builds off our existing allocation timeframe, to include more recent landings information.

CHAIR BELL: Thanks for that, Megan, and remember this is also basically aligning with recommendations from the PDT. Discussion of the motion.

MS. KERNS: For Board members I have Conor McManus and Joe Cimino.

CHAIR BELL: Okay, Conor, go ahead.

DR. McMANUS: I just wanted to express my support for the motion. Megan spoke to all the reasons that I was originally going to, probably more eloquently than I could have. Just summarizing, in the effort to try and streamline the document, and improve its clarity to the public, as well as in some instances remove some optics for arbitrary options within there. I think that this would be the best interest of the Addendum.

CHAIR BELL: Joe.

MR. CIMINO: I support where Megan is going with this, and all of the rationale the PDT put in here. I would prefer to see Option 6A removed and keep in 6B, which is a slightly longer timeframe. You know we've got a lot of interannual variability over the years, and you know 2012 is the first year before the quota was put in. It doesn't seem like there is a lot of discussion on this motion, so I am interested in making an amendment to do that.

CHAIR BELL: All right, if we don't have, Toni, do you have any other hands just discussing the motion before we maybe tinker with it?

MS. KERNS: I don't have any Board members. There is one member of the public.

CHAIR BELL: Well, we did say if we got into the motions, we could allow that if it is pertinent to the motion. I don't mind allowing just a very brief comment, but it needs to be brief and focused exactly on the motion.

MS. KERNS: I've got Jeff Kaelin.

MR. JEFF KAELIN: Yes, thank you, Mr. Chairman. I'm Jeff Kaelin; with Lund's Fisheries in Cape May, New Jersey. I'm also an Advisor, we've been in the menhaden fishery for decades, and sell into a number of fisheries from Maine all the way around to Texas. I wanted to give a shout out to Kirby also.

I've worked with him a long time, as all of you have. He's done a great job. Unfortunately, though, when we had the AP meeting, we only got to see this document the day before, and we did not see the PDT recommendation to remove the options in Ms. Ware's motion. Otherwise, I know I would have commented more directly on the concern.

I appreciate what Joe just brought up, because what 6B does, we've asked for many years to have 2012 catches be part of these formulas. You know back in 2011 or 2012 when the Amendment was first put into place and the quotas went in, we didn't know what the 2012 catches were, so 2011 was used, but it turns out that in 2012 we landed about 80 million pounds of menhaden in New Jersey, and in 2013 we were down to like 45 million pounds.

My point is, we've never really caught up to where we were. We're still not whole, in other words, to where we were before the quotas were implemented. As we stated at the AP that, you know since 2013, states with directed fisheries have worked within their quotas and not used transfers to increase their share of coastwide landings, even though fish remained in the area after we shut down.

There are all kinds of menhaden year-round down here. We're sympathetic to Maine, but I think if 6B could be retained that will help us. You know the Work Group agreed to put 2012 in here, and we had many lovely summer afternoons together talking about this. I imagine that Mr. Cimino will make a motion to amend Ms. Ware's motion.

If we can retain 6B, I think that helps that states that have been in the fishery the longest, and have the greatest amount of history. We've already given quota up over the last several years through this process. Those are my comments, Mr. Chairman, and I appreciate the opportunity to speak.

CHAIR BELL: Well, thanks, Jeff, and we appreciate your participation in the AP. That is important, so we do appreciate that input. Okay, with that, Joe, do you want to make a motion to amend?

MR. CIMINO: Yes, Mr. Chair, thanks, I would like to move to amend, and all I would be doing is striking Option 6B and replacing with Option 6A.

MS. KERNS: Mr. Chair, if I may. I think that would be motion to substitute 6B with 6A. I think I'm doing that correctly; I could be wrong.

MR. CIMINO: Toni, I actually googled. I really tried, but I'm not going to overrule you.

MS. KERNS: Well, if you Googled, Joe, then you can stick with it.

CHAIR BELL: Because he's inserting a different, I see.

MR. CIMINO: But it was only that one.

MS. KERNS: Yes, that's fair.

MR. CIMINO: If I get a second, I would like one more chance to again say something to it.

CHAIR BELL: It says move to amend to remove Option 6B and replace with Option 6A. Is that it, Joe?

MR. CIMINO: Yes, that's it.

CHAIR BELL: Okay, is there a second for that?

MS. KERNS: Justin Davis.

CHAIR BELL: Justin, thank you. Okay, so Joe, go ahead and speak to your motion.

MR. CIMINO: Yes, I think what Jeff Kaelin brought up was probably the most important element. But again, I think we just have a history of when we do these weighted time series, to try and incorporate a good number of years. Excuse me, Mr. Chair, just to be a little tongue in cheek. I also want to say that I think we're probably trying to make this meeting as painful as possible to Kirby. If you remember that scene from Harry and the Hendersons? I kind of feel like that's what we're doing today, so I felt like that was another important reason to add this.

CHAIR BELL: Thank you for that, Joe. Okay, so we have a motion, we have a second, we've heard from Joe explanation. A little input regarding this from an AP member. Further discussion of the motion, and this is a motion to amend.

MR. ROOTES-MURDY: Mr. Chair, I appreciate Joe's comments. I think it would be helpful to just make sure in this amended motion that we have the timeframe for Option 6A in there, so that would be 2009-2011 and 2018-2020. In all fairness, everything that you guys are saying, I want you guys to enjoy this document to the fullest extent possible when it's approved.

CHAIR BELL: This document could be your gift that keeps on giving, Kirby, I don't know. We just may plan this forever. No, we're going to get this done. We're going to take one for Kirby, and we're going to get it done. All right, good point. I'm assuming that's fine with you, Joe, putting the dates in. That makes sense.

MR. CIMINO: Absolutely, yes. I wasn't quick enough to add that myself. Thank you, Mr. Chair.

CHAIR BELL: That's why Kirby is Kirby. All right, any other discussion of the motion here to amend?

MS. KERNS: For Commissioners we have Pat Geer and Conor McManus. I don't know, Conor, if your hand is left over or not.

CHAIR BELL: Well, Pat, go ahead.

MR. GEER: My concern is, I just want to comment to what Jeff Kaelin said. You know I sympathize with wanting to use more years, and look at certain years because things were different. But in that same regard, 2020 because of COVID, traumatically impacted the states differently. Here in Virginia, our fleet was shut down for COVID protocol for over 39 days.

Adding 2020 into this, and we've talked about this from the very beginning, is not really representative of Virginia's fishery.

CHAIR BELL: Okay. Toni, who did you have after Pat?

MS. KERNS: I had Conor, but he put his hand down, so I'm assuming it was leftover, and now I Have Megan Ware.

CHAIR BELL: Okay, Megan.

MS. WARE: I appreciate Joe bringing some levity to the Board meeting, I needed a laugh there. I'm going to speak against the motion to amend. I think Option A, which is 2009-2011, really clearly builds off of our existing allocation to incorporate new years, which is one of the goals of this Addendum. Then I'll also note, I believe New Jersey sees increases in their quota under both Sub-Option 6A and 6B, so I see both options as being wins for New Jersey.

CHAIR BELL: Any other comments on the motion to amend?

MS. KERNS: Cheri Patterson.

CHAIR BELL: Cheri, go ahead.

MS. PATTERSON: Yes, I am going to oppose the amended motion also. I thought the whole premise

of pretty much of this Amendment was to pay more attention to more recent years, as opposed to anything further back.

CHAIR BELL: Again, what I'm looking for are comments specifically to this motion to amend.

MS. KERNS: You have one member of the public.

CHAIR BELL: All right, if it's specifically to this motion to amend, and we need to keep it to like one minute, I can go ahead and entertain that.

MS. KERNS: Tom Lilly.

CHAIR BELL: Go ahead, Tom.

MR. TOM LILLY: Mr. Chairman, I just wanted to make sure you were going to allow some public comment on a proposed amendment that we suggest that is in the general nature, and also a comment on the way that you're proceeding.

CHAIR BELL: All right. Right now, we're just looking for comments related to this particular motion to amend.

MR. LILLY: Okay, so hopefully you can call on me a little bit later.

CHAIR BELL: At an appropriate point, if it makes sense with what we're talking about, yes. Any other comments related to this specific motion to amend?

MS. KERNS: No additional hands.

CHAIR BELL: Okay, well then let's go ahead and vote on this. All in favor of the motion to amend, raise your hand.

DR. DAVIS: Mr. Chairman, can we have 60 seconds for caucus?

CHAIR BELL: Oh, I'm sorry, yes. My mistake.
MR. HASBROUCK: Yes, I agree, we need to caucus.

CHAIR BELL: Yes, go ahead. Take a minute.

MS. KERNS: The minute was up, if anybody needed more time, no one has raised their hand.

CHAIR BELL: If you need more time, just raise your hand really quick.

MS. KERNS: I don't see any hands.

CHAIR BELL: All right, we've had our caucus time, then we'll go ahead. We have a motion to amend to remove Option 6B and replace it with 6A, described there with the dates. All in favor of that motion to amend, raise your hand, please.

MS. KERNS: Just going to let the hands settle for a second. I have Rhode Island, New Jersey, Delaware, North Carolina, Maryland, and Potomac River Fisheries Commission. I will put the hands down. All right, I'm ready.

CHAIR BELL: All right, all opposed to the motion to amend.

MS. KERNS: Letting the hands settle. I have New York, Massachusetts, Maine, Pennsylvania, Virginia, and New Hampshire. I will put the hands down, I'm ready.

CHAIR BELL: All right, all of the abstentions.

MS. KERNS: I have Florida, South Carolina, Georgia, NOAA, and the Fish and Wildlife Service.

CHAIR BELL: Null votes.

MS. KERNS: Want me to put the hands down first, before we ask for nulls. Okay, now we can have nulls.

CHAIR BELL: Null votes.

MS. KERNS: I have 1 null vote, Connecticut.

CHAIR BELL: Okay, unless you kept the total there, I didn't.

MS. KERNS: Kirby, correct me if I'm wrong, but I have 6 in favor, 6 against, 5 abstentions and 1 null. Is that what you counted?

MR. ROOTES-MURDY: Sorry, I missed the in favor. I had 6 against as you noted, I have 5 in abstention and 1 null.

CHAIR BELL: Do we need to clarify the in favor, Toni?

MS. KERNS: I had six.

CHAIR BELL: Yes, I actually made six little stick marks here.

MS. KERNS: Maya also counted 6 as well, so I think we're good.

CHAIR BELL: Okay, so we have a tie.

MS. KERNS: I believe in Roberts Rules that the motion would fail for lack of majority.

MR. DENNIS ABBOTT: Correct.

CHAIR BELL: That sound familiar.

MS. KERNS: We have Joe Cimino with his hand up.

CHAIR BELL: Joe.

MR. CIMINO: That is certainly Roberts Rules, and that was certainly an interesting vote. I regret not trying to take a second bite at the apple before we voted, because I was really confused by two of the comments against. One was that 2020 was included in this motion, but 2020 is in the original as well. That wouldn't change anything.

The other is that we're not moving into a more recent time period. I'm also very confused at how that would change, because again, the most recent years are in there, it's simply a longer time series. I realize we're back to the main motion, but I don't know if anyone has any other way to attempt to look at this again, because it seemed like some of the folks against were confused, and that was an awful lot of abstentions.

CHAIR BELL: I agree, Joe. Procedurally right now, we are back with the main motion in front of us. Perhaps even discussing the points you just brought up under discussion of the main motion. Any further discussion of the main motion as it stands right now?

MS. KERNS: Justin Davis.

CHAIR BELL: Justin.

DR. DAVIS: I guess in response to the comments Joe just made, would it be within bounds at this point to make a motion to amend, to just remove Option 6B from this motion, thereby keeping 6A and 6B in the document for now, and sending both out for public comment. Because it's apparent that there is a pretty divided opinion on which of these options is the best path forward.

CHAIR BELL: I follow you. By removing 6B from this, you keep them both in and they're still. Okay. All right, any further discussion, thoughts on that approach?

MS. KERN: It's certainly in the priority of the Board, but I have Dennis Abbott, followed by Tom Fote.

MR. ABBOTT: To Mr. Davis' comments. I think my interpretation of Roberts Rules is that we've already voted it down the previous motion, and I don't think that we can resurrect parts of that motion. In my interpretation of Roberts Rules, if someone wanted reconsideration, it would have to come from somebody on the prevailing side of the motion to ask for reconsideration. I don't think the suggestion of Mr. Davis is proper at this time. That's only my opinion and my interpretation of Roberts Rules.

CHAIR BELL: Thank you, Dennis. I think though that does sound logical, and I think you've got more experience with that than I. I think where we are right now is we've got this motion. To come back to it, we need to clear this, and then any additional

thing we want to do after that would be an entirely separate action, if I'm correct.

MS. KERNS: Mel.

CHAIR BELL: Yes.

MS. KERNS: Bob put his hand up, then he put it back down. He has his hand up.

CHAIR BELL: Bob.

EXECUTIVE DIRECTOR ROBERT E. BEAL: Just waving around over here. Thank you, Mr. Chair. I just wanted to comment. I think where Justin may have been going is different than where Joe Cimino and others were going. In other words, I think Justin was saying remove the consideration of anything to do with Option 6A or B out of this motion, and limit this motion to removing Option 2 and Option 4 from Section 3.1.2.

If that is where Justin is going, I would argue that is in bounds. You know the Board made some motion and substitutions and other things to keep three options in this motion for consideration. But it sounds like, if I understood Dr. Davis correctly, he was saying, maybe let's just take out that third bullet all together, simplify this motion, and just have it deal with Option 2 and 4.

Option 6A and 6B would remain in the document for public comment. I would think that would be inbounds, because it is a different strategy than what the substitute motion that was just addressed by the Board was dealing with. But that's again, as Dennis said, just my interpretation.

CHAIR BELL: Yes, and I'm struggling with that, in terms of what procedurally. Usually what happens is, if you have a motion to amend you deal with that. Then, you move one direction, if it becomes a main motion. Then if it doesn't then generally you move right back to the motion you had. That's where I'm at. I guess Dennis had one interpretation; you've got another. I mean if we can do that it would require then us to amend this motion before we throw it out, right? Procedurally that is what we would need to do with it. It would have to be a motion to amend it.

EXECUTIVE DIRECTOR BEAL: That would be my advice. If someone is interested in removing the third bullet from this one, yes, a motion to amend would be in order.

CHAIR BELL: Okay, why don't we entertain that then? I'm not the Roberts expert, but I think basically we've established a clear record of the rationale here in what we're trying to achieve. If someone would like to make a motion to amend, then we'll entertain that.

MS. KERNS: I have in my list, Tom Fote, Justin Davis, Lynn Fegley.

CHAIR BELL: I'm thinking to get to the point right here, and Tom's hand was already up. Maybe Justin, were you going to kind of move this forward, in kind of what we were discussing?

DR. DAVIS: Yes, that was my intent, Mr. Chairman. I could make that motion at this time if you would like me to.

CHAIR BELL: Yes, let's go ahead and do that.

DR. DAVIS: I would move to amend to remove Option 6B, weighted allocation timeframe 6B (2009-2012, and 2017-2020).

CHAIR BELL: Okay, is there a second for that motion to amend?

MS. KERNS: Yes, Tom Fote.

MR. THOMAS P. FOTE: Yes.

CHAIR BELL: Well, go ahead, Tom. I suspect you had something else before that, but go ahead.

MR. FOTE: No, that's what I was going to do is make the motion.

CHAIR BELL: Good deal, thank you, bless you. Okay, so we have a motion, we have a second.

Discussion of this motion to amend. I think folks' kind of follow what we were trying to do here, is trying to get back to a little bit of where we were heading. It's not the perfect way to do it, but I think it's getting us moving towards something folks seem to kind of agree on a little bit. Any discussion of this motion to amend?

MS. KERNS: I think that Dr. Davis and Mr. Fote had their hands up residual, so unless those weren't residual hands, I have Lynn Fegley.

CHAIR BELL: Okay, Lynn, go ahead.

MS. FEGLEY: I think this is, given the conversation, the best way to go. I would say that also given the commentary. If this motion carries and becomes the main motion, I would ask the Board maybe to start thinking about within the weighted options, about the potential of removing the options in both 6A and 6B that weight 75 percent toward history. Removing the options that more heavily weight toward the past, just so that we take something out for the sake of the public, and because of the intent of the Addendum, which is to more reflect recent fisheries. I'm just going to put that out there right now, for people to put in their brains and leave it there.

CHAIR BELL: Thanks for that, Lynn, good point. All right, any further discussion of this motion to amend?

MS. KERNS: No hands.

CHAIR BELL: Okay, no hands. Does anybody feel they need to caucus before we vote on this?

MS. WARE: Yes, please, 30 seconds.

CHAIR BELL: Okay, well, take a minute. All right, assuming everybody has had sufficient time to caucus. We'll go ahead and vote. What we're voting on is the motion to amend to remove Option 6B, as you're looking at it. All in favor of the motion to amend raise your hand.

MS. KERNS: Just letting the hands settle here. I have Rhode Island, New Jersey, New York, Florida, Connecticut, Massachusetts, Georgia, Pennsylvania, Delaware, North Carolina, Maryland, New Hampshire, and Potomac River Fisheries Commission. I will put the hands down.

CHAIR BELL: All right, maybe I should have done this a different way, but we're okay. Anybody opposed to the motion, raise your hand.

MS. KERNS: Virginia and Maine.

CHAIR BELL: Okay, any abstentions?

MS. KERNS: NOAA, Fish and Wildlife Service, and South Carolina.

CHAIR BELL: All right, and any null votes?

MS. KERNS: No null votes.

CHAIR BELL: Okay, so then the motion carries. We would put the results up there.

MR. ROOTES-MURDY: Yes, my count is 13 in favor, 2 against, 3 abstentions and 0 null.

CHAIR BELL: Okay. Thanks, Kirby. All right, so then that motion carries, so then we're going to need to make a modification to what will be the main motion that we'll be voting on, which would be simply removing that language there, right? **Okay, so now, we have the main motion which is the modified former motion, which is to remove from Draft Addendum I, Section 3.1.2, Option 2 and Option 4 only.** That is the motion, does anybody need to caucus on that?

MS. KERNS: I have Tom Fote with his hand up.

MR. FOTE: It's not to caucus, because doesn't that cover, not the motion, just to caucus when it becomes a motion.

CHAIR BELL: All righty, thank you, nobody needs to caucus.

MS. KERNS: No.

CHAIR BELL: Is there any opposition to the motion?

MS. KERNS: I see no hands raised in opposition, but NOAA and Fish and Wildlife Service has asked me to note their abstentions, so Maya when you're ready to write out however Mel announces it, if you could just note those abstentions.

CHAIR BELL: I guess technically, Toni, I've been abstaining, so I guess I should abstain as well.

MS. KERNS: Up to you, you don't have to.

CHAIR BELL: Just for consistency's sake. All right, so then we have whatever the number is in favor and we just have three abstentions. Then the motion passes.

MS. KERNS: Mel, you can just say, motion carries without objection.

CHAIR BELL: Motion carries without objection.

MS. KERNS: With 3 abstentions.

CHAIR BELL: Three abstentions. All right, thank you. A little progress. Moving along then. We're still under the heading of dealing with Step 2 timeframe stuff. Any additional motions related to potentially removing things?

MS. KERNS: I have Cheri Patterson.
CHAIR BELL: Okay, Cheri, go ahead.

MS. PATTERSON: Yes, I would like to place a motion to eliminate sub-option 3 from both Options 6A and 6B.

CHAIR BELL: Okay, let us switch screens and get that up there, Cheri.

MS. PATTERSON: Sub-option 3 to both 6A and 6B. That would be Sub-option.

CHAIR BELL: Does that cover it, Cheri?

MR. ROOTES-MURDY: I think it might, just to have it clear on the record, move to eliminate Sub-option 3, the weighting is 75% /25% and again what we're talking about here is 75% for the older timeframe and 25% to the newer timeframe, and then the option as noted are for 6A, that's 2009 through 2011, and 2018 through 2020, and then 6B is 2009 through 2012 and then 2017 through 2020 in Section 3.1.2.

CHAIR BELL: It's on Page 13 of the document.

MS. KERNS: I have Lynn with her hand up, I assume she's seconding, yes.

CHAIR BELL: If Cheri that looks like what you want, and Lynn, if you are seconding that.

MS. PATTERSON: Yes, thank you. Thank you, Kirby, for perfecting that.

CHAIR BELL: Okay, Lynn, were you seconding that?

MS. FEGLEY: Yes, please, thank you.

CHAIR BELL: All right, so we have the motion before you for consideration. I have a second. Discussion of this motion.

MS. KERNS: Cheri, Tom Fote, and Pat Geer.

CHAIR BELL: Okay, Cheri, go ahead.

MS. PATTERSON: I'm sorry, that was residual.

CHAIR BELL: I didn't know if you wanted to provide some rationale.

MS. PATTERSON: I'm sorry, my rationale would be to focus more on recent years and less on past years.

CHAIR BELL: Okay, Tom.

MR. FOTE: It seems like a second bite, but I'll leave that at that. Basically, we are talking about going out to public hearings. I'll reiterate what I said yesterday during Striped Bass. We're sitting here nit picking again a document and going over it. We should leave this and go to public hearings. That's

what those folks do. There might be a lot of people feeling like they want to pick, based on past fisheries.

That is not wrong. That should be in the document. We should be laying all these heavy weighted into this document. To arbitrarily move one that is better for you than the other, then we should start going through what you might have gone through all the ones that are better from one state to another. I think this is an exercise in futility. If you just go to public hearings, and then what you have is debating comments from the public hearings come back. I'll just leave it at that.

CHAIR BELL: Thanks, Tom, Pat.

MR. GEER: I can't support this motion, it minimizes historical performance in the fishery, and as I pointed out before, it weighs heavily on the most recent data. As I pointed out, 2020 was a COVID year, and the data from that year, the landings from that year are not representative of the fishery as a whole, so I cannot support this motion as written. I could get behind a motion of a 50/50 split. That would be most equitable to me. But I cannot support this, and I said this when we went through this last time as well, so I cannot support this.

CHAIR BELL: We've had speakers to the motion and a couple opposed. Does anyone else want to speak in favor of the motion?

MS. KERNS: I have no other hands.

CHAIR BELL: Any further discussion of the motion, period?

MS. KERNS: No hands.

CHAIR BELL: All right, then I think I know what we need to do. Then all in favor. First of all, does anyone need to caucus?

MS. KERNS: I have hands for a caucus.

CHAIR BELL: Okay, let's take a minute to caucus. All right, that's one minute to caucus, everybody finished with the caucus? All right, I have a hand up from a member of the public. I can give you one minute, Tom, to say something specifically to this motion.

MR. TOM LILLY: It's not on this motion. I just wanted to make sure you could give me a chance to say something.

CHAIR BELL: We'll get to you. I'm trying to move through these motions. All right, we've caucused, let's vote. All in favor of this motion, raise your hand, please.

MS. KERNS: Letting the hands settle. I have Rhode Island, New York, Florida, Massachusetts, Georgia, Maine, Pennsylvania, North Carolina, Maryland, New Hampshire, and Potomac River Fisheries Commission. I will put the hands down.

CHAIR BELL: All right, the hands are cleared. All opposed to the motion, raise your hand.

MS. KERNS: Letting the hands settle. I have New Jersey, Connecticut, Delaware, and Virginia.

CHAIR BELL: All right, abstention.

MS. KERNS: Before we do abstentions, I just need to clear the other hands. Sorry. Okay, now I'm ready for abstentions.

CHAIR BELL: Okay, abstentions.

MS. KERNS: I have South Carolina, Fish and Wildlife Service and NOAA.

CHAIR BELL: All right, thank you, any null votes?

MS. KERNS: No null votes.

CHAIR BELL: All right, so then the motion passes, and the score is whatever.

MR. ROOTES-MURDY: I have 11 in favor, 4 against, 3 abstentions.

CHAIR BELL: All right, motion passes, 11 in favor, 4 against, 3 abstentions and no null.

MS. KERNS: You have Pat Geer with his hand up.

CHAIR BELL: Go ahead, Pat.

MR. GEER: I would like to put in another motion. Move to eliminate Sub-option 1 (weighting 25/75) to both 6A (2009-2011/2019-2020) and 6B (2009-2012/2017-2020).

CHAIR BELL: They're going to need to talk to you. You haven't sent that in.

MR. ROOTES-MURDY: Give us a second. I'll help Maya out with this. It's the opposite of what we just did, so in terms of the percentages Sub-option 1, 75% for the older timeframe, and 75% for the newer timeframe from Option 6A. Again, we'll give Maya a moment to put in those timeframes for 6A and 6B.

MS. KERNS: Kirby, I think it might help Maya if you just read very slowly what she needs to write.

MR. GEER: You could have just copied it from the last one and then inverted the numbers.

MR. ROOTES-MURDY: Yes, that's what I'm suggesting. Just give us a minute while we get that up on the screen.

MR. GEER: If I get a second, I'll give an explanation why.

CHAIR BELL: Thanks, Pat. Is that worded correctly?

MR. ROOTES-MURDY: This is in Section 3.1.2.

CHAIR BELL: Okay, is that it, Pat?

MR. GEER: That looks correct.

CHAIR BELL: Is there a second to this motion?

MS. KERNS: I have Craig Pugh.

CHAIR BELL: Okay Craig, second, thank you. All right, so Pat, would you like to go ahead and speak to the motion then?

MR. GEER: I just think shifting the weighting that far is not appropriate at this time. I could live with a 50/50 split. I mean it's treating the older data equally as the newer data. There is a historical performance there. I think that this is just a dramatic shift. If we're going to remove the one, I want to remove both weighting factors.

I just want to have an equal weighting factor if this is what we do, a 50/50 split. I think this is the fairest thing between all the states. To treat states that have a historical fishery equally as the states that are having emerging and newer fisheries.

CHAIR BELL: All right, so Pat is explaining the rationale there. Any other discussion of the motion for or against, either way?

MS. KERNS: I have Nichola Meserve and Joe Cimino.

CHAIR BELL: Okay, Nichola.

MS. MESERVE: I'm not going to be supporting this motion. I struggle with Mr. Geer's rationale a little bit, just based on the fact that there is an option that puts 100 percent of the weighting on 2018-2020 option A3 in the document. This option is a step down from that. I would like to see it maintained in the document.

CHAIR BELL: All right, thank you, Nichola, Joe.

MR. CIMINO: I'll turn it back over. I'm struggling with this. We certainly need some time to caucus on it.

MS. KERNS: Justin Davis and then Dennis Abbott.

CHAIR BELL: Okay, Justin, go ahead.

DR. DAVIS: I can appreciate Pat's rationale through this motion. I think what's unfortunate about the motion we just passed, and if we were to pass this

motion, is that it takes flexibility away when it comes time for final action. When I look at these things I always think about, you know we're creating bookends, and the Board always has the option to adopt something that is within the range of what's considered.

If we were to pass this option, now we're left with simply one sub-option under 6A and 6B, which I think would be unfortunate. It's taking away flexibility from the Board when it comes to final action time. I think because of that. I didn't support the last motion and I think for the same reason I wouldn't support this motion.

CHAIR BELL: All right. Did I run out of people?

MS. KERNS: Dennis Abbott.

CHAIR BELL: Dennis, I'm sorry, go ahead.

MR. ABBOTT: I'm opposed to this motion. Getting rid of this takes us away from where we're trying to go with this plan, because when we read the statement of the problem, it tells us that we're trying to realize that the dynamics in the commercial menhaden fishery have changed, and we're trying to address that. But yet at the same time, we want to have more reliance on past history. We can't always live on past history; we have to be closer to current history. That's what we're trying to achieve here, so therefore I'm opposed to this amendment.

CHAIR BELL: All right, thank you, Dennis.

MS. KERNS: Tom Fote and then Craig Pugh.

CHAIR BELL: Tom.

MR. FOTE: My problem with this is basically when we passed the last motion we started down the slippery slope, with everybody looking to see what the advantage was to them. Now I'm going to have to set up a caucus with Joe [Cimino] over whether we support this, but I didn't support the last motion, but I might support this one.

CHAIR BELL: All right, thanks, Tom, Craig.

MR. PUGH: Dennis spoke to the future. The past has been important to us. Virginia has been a great provider of menhaden for most of the southern states from Florida to at least New Jersey, and possibly up into New York. When we take away from that past history of doing business on the commercial end, it seems as though there has been an attempt of a power grab of our allocation, and dependability and the affordability of that bait consumption. That would be my reason for supporting Mr. Geer's motion.

CHAIR BELL: All right, thanks, we've heard some for and some against. Just keep in mind in the interest of time, in time to get everything done that we need to today. I'm not feeling that we're going to maybe achieve our primary goal here. But we do have some other items we need to cover as well.

I've been told we can maybe squeak this until 12:30, but that's all the time we're going to have. I would like to go ahead and we've heard some pro and con on this. I would like to go ahead and allow you to caucus if you need to caucus. I'll give you a minute, and then we can come back and dispense with this motion. All right, if everyone has had time to caucus. Let's go ahead and vote on this. You have the motion in front of you. Move to eliminate Sub-option, all the additional verbiage there, you're looking at it. All in favor if the motion, raise your hand.

MS. KERNS: I have Delaware and Virginia. I will put the hands down.

CHAIR BELL: Hands down, all opposed to the motion.

MS. KERNS: Letting the hands settle. I have Rhode Island, New Jersey, New York, Florida, Connecticut, Massachusetts, Georgia, Maine, Pennsylvania, North Carolina, Maryland, New Hampshire, and Potomac River Fisheries Commission. Hands are down.

CHAIR BELL: Hands are down, then abstentions.

MS. KERNS: I have South Carolina, NOAA, and Fish and Wildlife Service. Hands are down.

CHAIR BELL: Null votes.

MS. KERNS: No null votes.

CHAIR BELL: Alrighty, no null votes; that motion fails.

MR. ROOTES-MURDY: Mr. Chair, it was 2 in favor, 13 against, and 3 abstentions, based on my count.

CHAIR BELL: Okay, motion fails 2 in favor, 13 against, 3 abstentions, no null. All right, thank you. Other motions, we've got some time still. Other motions related to things that we can do with the document right now to help it work towards public comment. I guess we had some other motions in the motion box there, Kirby. I don't recall, but yet we're still under 3.1.2.

MR. ROOTES-MURDY: Yes, Mr. Chair, it appears you have Erika Burgess with a hand raised.

CHAIR BELL: Okay, Erika. Go ahead.

MS. BURGESS: Mr. Chair, I would like to make a motion to remove Option 5 from 3.1.2, and that's moving average option.

CHAIR BELL: All right, we'll get that on the board, and that would remove Option 5.

MS. KERNS: I have Pat Geer as the second.

CHAIR BELL: Pat Geer seconds, thank you very much. We have a motion to remove Option 5 under 3.1.2, seconded by Mr. Geer. Discussion of the motion. Erika, would you like to speak to the motion first?

MS. BURGESS: Yes, Mr. Chair, thank you. I think that this is an option that the Board needs to have a serious discussion about. I think that an option like this will have the potential to be very disruptive to the fishery. It also incentivizes a race to fish, and could lead to us exceeding the TAC. We've already spoken today about the intent to revisit allocations every three years would be in place, so I don't know that the smoothing average option is the best fit for this Addendum.

CHAIR BELL: Other discussion of the motion to remove Option 5 under 3.1.2.

MS. KERNS: I have Lynn Fegley and then Megan Ware.

CHAIR BELL: Okay, go ahead, Lynn.

MS. FEGLEY: I would not support this motion. I think this actually has some ability to help us manage this thing over the long term, if these fish do have a pattern of changing distribution up and down the coast it will maybe help us be a little more adaptive, without having to go through this agony over and over again.

However, to Ms. Burgess' point, I think there is probably some clarifications that could be made, including the fact that quota overages would not be included in a running average. That's to say if a state exceeds a state quota, just blows over the quota, that would not be included in that average calculation. I think there are a few clarifications we could make, but I would not support removing it from the document. I think the public needs to hear about this, sort of a new and creative way to handle things.

CHAIR BELL: Megan.

MS. WARE: Yes, I would oppose this motion at this point. I think this is actually a really unique option that I would be interested in hearing public feedback on, specifically because it is kind of self-correcting. I know one of the concerns or one of the topics that we had in the work group last summer was, you know is the menhaden biomass in New England here to stay, or is this a ten-year trend that changes after that decade?

I think this type of option would actually consider the movement of menhaden. It would, if menhaden were to leave New England, would self-

correct, and that quota would go back to the Mid-Atlantic States. I think there is really the cool features, I'll say about this option, that I would like to keep it in.

CHAIR BELL: All right, thanks for that, Megan.

MS. KERNS: Conor McManus, David Borden and Joe Cimino.

CHAIR BELL: Okay, Conor, go ahead.

DR. McMANUS: I am also in opposition to the motion. I think this is, in this section, one of the options that could potentially best speak to the goals that we're trying to achieve here. I won't repeat Lynn and Megan, but I guess, again the ability to dynamically allow for quota to be with the resource's availability is a really appealing option that I would greatly appreciate the public's input on. I also, just speaking to the title of the moving average.

I think its goal of trying to not have abrupt shifts from year to year by using a window for averaging across several years as you move is it very helpful. Also, for states with some of the perhaps hard quotas, thinking about that fixed minimum that is also there. It's important when thinking about the moving average, in terms of what type of variability you may even see for catch from year to year. For all the reasons there, as well as what's been discussed already, I oppose the motion to remove.

CHAIR BELL: Okay, was it David you had next?

MR. BORDEN: Yes, Mr. Chairman. I won't repeat what Lynn and Conor just said, other than the fact that we need to move in this direction on a number of species, because this moves allocation both north and south, depending upon what happens to the resource. I think it's kind of a progressive way to address this, so I'm opposed to this motion.

CHAIR BELL: Joe, go ahead, and then I would ask anybody after Joe, if there is anybody else that wants to speak in favor of it, we could hear that. But we're going to move on this fairly quickly. Go ahead, Joe.

MR. CIMINO: I didn't realize I was in such a long queue. I'm in a position for all the same reasons mentioned.

CHAIR BELL: Got you. Okay, anyone else have a different opinion here? We've kind of heard a lot of opposition. I just want to make sure we allowed voice to those that might be in favor.

MS. KERNS: I have three hands, Rob LaFrance, Russel, and Erika.

CHAIR BELL: Okay, Rob, is yours to speak in favor?

MR. LaFRANCE: I guess I just wanted to mention the fact that the issue here is if you keep it in, I think it's really important that this clarifying that Lynn mentioned, I just want to make certain that is clear. Because the way these things are going to work, if you go over your allocation, that's not going to be a benefit for you in the moving average. I just wanted to make that point.

CHAIR BELL: Okay, thanks, who was next, Toni?

MS. KERNS: Russell.

CHAIR BELL: Russell, go ahead. We have a technical difficulty there. Who was after Rob?

MS. KERNS: Erika was the last hand.

CHAIR BELL: Okay, Erika, do you want to follow up what you started?

MS. BURGESS: Yes, thank you, Mr. Chair. Like I said when I first made this motion. I wanted the Board to have discussion on this, and I appreciate the discussion that was brought up today. I agree with Lynn that this needs to be clarified if it stays in the Addendum. That's fine with me. I appreciate the discussion that folks had. I also did want to point out, it's contrary to the discussion earlier, but folks wanted to revisit this, every three years. If that is

not the intent, then I think that should also be part of this option.

CHAIR BELL: All right, let's go ahead and dispense with this one. Does anybody feel they need to caucus?

MS. KERNS: Hands up for caucus, yes. One caucus, yes, Emerson has his hand up.

CHAIR BELL: Okay that's fine, go ahead and take a minute. Okay, assuming everyone that wanted to caucus has caucused. Let's go ahead and vote on this. Motion is to remove Option 5 from 3.1.2. All in favor of the motion, please raise your hand.

MS. KERNS: I have Florida and Virginia. I'm going to clear the hands. I'm ready.

CHAIR BELL: All right, all opposed to the motion.

MS. KERNS: I'm going to let the hands settle for a second. I have Rhode Island, New Jersey, New York, Connecticut, Massachusetts, Georgia, Maine, Pennsylvania, Delaware, North Carolina, Maryland, New Hampshire, and Potomac River Fisheries Commission. I will clear the hands.

CHAIR BELL: Abstentions.

MS. KERNS: I have South Carolina, NOAA and Fish and Wildlife Service.

CHAIR BELL: All right, clear the hands, and any null votes.

MS. KERNS: No null votes.

CHAIR BELL: Okay, then the motion fails, put the score up there. Motion fails.

MS. KERNS: Two in favor, 13 against, and 3 abstentions.

CHAIR BELL: All righty. Looking at the clock and looking where we are. We still have some other items that we have to dispense with on the agenda. I'm not sure that we really have enough time to take a serious bite out of this. Kirby, what do you think? Is there some sort of low hanging fruit, perhaps, from what you're seeing we could take a swing at?

MR. ROOTES-MURDY: It's the pleasure of the Board. If there is an interest in trying to push forward as far as you can, you know we can do that. There are two other sections to tackle, the Episodic Even Set-Aside Program and Incidental Catch and Small-Scale Fisheries. I have a presentation for each of those sections, as well as Plan Development Team recommendations, AP comments, and then I would take any questions folks have on that. I do know there are some motions some folks have prepared for Incidental Catch and Small-Scale Fisheries. It's your call how far you guys want to get today on that.

CHAIR BELL: Got you. Yes, I would kind of maybe ask Bob and maybe even Chairman Spud here. I realize we're going to be pushing into other things, but we don't have a tremendous, I mean hopefully nobody is catching a flight today. Bob, do you have any feedback on best approach here? We could wrap this up, move on to the rest of the agenda, try to get it all done by a little after 12:30. I think we've perhaps exhausted our time.

EXECUTIVE DIRECTOR BEAL: Yes, thanks, Mel. I'm chiming in, and Spud can correct me if he disagrees. Yes, it seems to make sense to keep pushing a little bit and see. Well, let me back up a little bit. It is becoming clear that the document may not be ready for final approval at this meeting, and the PDT is going to have to go back and do some more work.

You know if there are areas that Kirby and others on the PDT think they might really need some more guidance on, or are critically important for moving forward, we should focus on those. But you know I think going a little bit later, one o'clock or so maybe. We get done with Business Session at 3:30, I think it is today, we've got a schedule to get done relatively early.

But I know we don't want to push it too late. I would say, see what you can get done maybe by

one o'clock, and that's really just a made-up arbitrary time. You know if you get close to one o'clock and you need another ten or fifteen minutes, I'd say push through. That is just my opinion, and the Chairman can obviously change that if he wants to.

CHAIR BELL: Okay, Spud, do you have any new guidance there? I think I'm fine with trying to move to one. I think I would recommend right now at this point of inflection, maybe we take five minutes for a bio break, come back and see what we can get done, plus the rest of the agenda items.

MR. A.G. "SPUD" WOODWARD: I'm fine with that, Mel. I think as Bob said, focus on the things that will help the PDT improve the document, because I don't believe that we're going to get it, no way we're going to get it to the point of going out to the public. These next issues in some ways are even more contentious than what we've already dealt with.

I'm fine with us going through 1:00 p.m. and hopefully use that remaining time most fruitfully, and we don't have a looming hard deadline on this document. Even if we push back into May, hopefully complete it for public input in May, get final approval in August. We'll still be in a position to use the results of this Addendum for 2023. If that sounds good, I would say proceed.

CHAIR BELL: Okay, what I would like to do then. We'll take five, just five, and Kirby will just kind of get some thought to how best we can maybe tackle a couple of things or answer questions to better inform the PDT as we move forward, but being sensitive to the things that we're doing that they've got to then respond to. I'll touch base with him in a second, now let's go ahead and take a quick five, folks. Thank you.

(Whereupon a recess was taken.)

CHAIR BELL: Let's try to push on, to see how far we can get in the document. It may be that there are some things that are a little easier to work through, and we may be able to make a little bit more progress. We'll just see how much progress we can make in the time we have, because I would really like to take advantage of, particularly having Kirby's expertise onboard as we work through this. When we left off, we were in 3.1.2. Kirby, do you have any other motions that people have sent in that would be applicable at this point, or should we push on to the next section, or what's your thoughts there?

MR. ROOTES-MURDY: I don't, but there may after this break, might have had some additional items they want to adjust for change. You might want to ask Board members.

MS. KERNS: You have Nichola Meserve.

CHAIR BELL: Okay, Nichola.

MS. MESERVE: I don't have a motion, but regarding the discussion about Option 5. I was just hoping that for the next Board meeting the PDT could bring back its recommendation for which landings, under what category of landings would contribute to the three-year moving average, whether quota overages count, whether episodic event set-aside landings count. Just to make that option a bit more clear for the public.

CHAIR BELL: Thanks, Nichola, we'll just take that as direction to staff to make that happen. Any other hands right now?

MS. KERNS: Not from Commissioners.

CHAIR BELL: Okay, any Commissioners, there are no other motions related to 3.1.2.

MS. KERNS: No.

CHAIR BELL: Okay, then let's, Kirby, do you want to move to the next section, or what do you think we can make the progress perhaps?

MS. ROOTES-MURDY: I appreciate Maya putting this up, I think it's helpful. Just as a recap of what has been modified in the Addendum thus far, just so people have this image in our head. Again,

based off the conversation today there are going to be a number of edits to the allocation section to reflect those points brought forward by Board members. With no other changes to the section, we can move on to the Episodic Set-Aside Program Section.

That should go pretty quick, I think, but we'll see. Here just again quickly, the objective is to ensure sufficient access to the episodic changes and regional availability, in order to minimize in-season disruption and reduce the need for quota transfers. We have really just two main items here in this section, which is under 3.2.1, increase the set-aside, and as noted before there is a request to increase the set-aside up to 5 percent. That's Option 2.

Then the next subsection, 3.2.2, it's to establish a set-aside during specifications. Now, I will admit we may have overlooked how to make this clear in the document. Because really, what this subsection is offering is if Option 2 in 3.2.1 is selected, which is increasing up to 5 percent. Then the second option under establishing the set-aside during specifications makes sense. But if the Board, for example, were to choose status quo, and keep the set-aside at 1 percent, then really setting the set-aside during specifications would be moot. I just want to make sure that that is clear to people.

I'm sorry that that wasn't as clearly indicated in the document, and with Board consent we can make sure that that is corrected in the document to be clear. Next, we have no PDT recommendations, but there is AP comments, and I'll turn to Meghan Lapp for that.

MS. LAPP: Yes, the AP had a discussion about this, and there were some AP members that recommended considering extending the states that qualify for episodic events be all the states. The discussion around that is that episodic events can happen anywhere, particularly high abundance can happen in other states, other than those north of New York. There was also discussion about whether or not to keep episodic events as part of the management program if some of the other alternatives go forward.

CHAIR BELL: All right, thanks for that. I can see what the opinion there, what came out of the AP's discussion.

MR. ROOTES-MURDY: With that, if there are any questions for the Board on this section, I'm happy to answer them now. Just again to note, you know if there aren't any motions to modify this section, you know we can move on to the incidental catch and small-scale fisheries. Just putting that out there for people's consideration.

CHAIR BELL: Yes, following the pattern we've been following. Now, any questions from Board members related to this section for Kirby?

MS. KERNS: I have Rob LaFrance and then Allison Colden.

CHAIR BELL: All right, Rob, go ahead.

MR. LaFRANCE: I just want to follow up, kind of what we started this whole discussion about, the difference as we move from allocations that were sort of basically the ones that were set aside like the 5 percent. I should say 0.50 percent, the minimum allocations. I guess the question that has always come up is, are we going to use those percentages to help increase up to 0.50 percent, or are we just going to take a look at the whole of the TAC, and then take 5 percent off the top, and move things down the other way?

I think this was what Justin Davis was trying to get at. I thought we were going to try and revisit that here, and maybe get some discussion about that. That's what I'm trying to understand. Are we going to take the savings that we've gotten from changing some of the minimum allocations, and are those something that would be made available for this program, or is Kirby going to look at that a little differently? I guess I'm just looking for some clarification from Kirby, and from folks on the PDT about that.

CHAIR BELL: Thanks, Rob.

MR. ROOTES-MURDY: Sure, I'm happy to answer that. Thanks for bringing that up, Rob. This is where I think this section is probably the best place to put it, because keep in mind that for the fixed minimum. If the tiered approaches are not selected, then there isn't really a change to how much, so to speak, freed up quota could go to the episodic.

But there can definitely be a move to increase that decision point in here if there is specific language that you all think should be put on the record at this point to make sure it's in there, or leave it at the discretion of the Plan Development Team. You know whatever your preference at this stage is fine. Yes, this is the section to make that note.

CHAIR BELL: Okay, thanks for the clarification, Kirby. Allison.

MS. COLDEN: Rob hit the nail on the head. I was just making sure that we were going to circle back to this exact point. I think the conversation we had earlier today was, that the quota freed up if a different fixed minimum was selected would be reallocated amongst the states on the reallocation formula that is derived from this Addendum.

But we also have here in the EESA section that it could be used if an option was selected to increase the EESA. I think maybe the clearest way to do that would be to add a sub-option, but I defer to Kirby as to whether or not just including language here that it is an option to put that forward to the EESA or any other, you know pot. If that is sufficient, or if we need to specifically add an option for the public to weigh in on in that regard.

CHAIR BELL: What are your thoughts on that, Kirby? Modify language, or actually add sub-options?

MR. ROOTES-MURDY: Well, if the Board is fine with this approach, what I would suggest at this point is for the Plan Development Team to start off with having a new subsection that obviously would be contingent on a decision made in the allocation fixed minimum specification. If there is additional freed up quota, you know there would be options in there that would outline where that freed up quota would go. We would add a new subsection to this part of the document.

CHAIR BELL: At this point this would be direction to the PDT to work on that and bring it back?

MR. ROOTES-MURDY: Correct.

CHAIR BELL: Does that make sense to everybody? Problems with that, provide direction to the PDT to come back with that for us at the next meeting?

MS. KERNS: Kirby, I just want to, Mel, is it okay if I ask one question to make sure I understand?

CHAIR BELL: Oh yes.

MS. KERNS: Since Kirby will be gone. Kirby, what that essentially does is because then the freed-up quota does not go into the allocation, that it could go two different directions, either to the EESA or the allocations. Then it basically doubles the number of options that would be in the document. Is that correct?

MR. ROOTES-MURDY: Yes, it's a good question that you bring up. It would increase the number of options. I'm thinking through this stuff on the fly a little bit, and as everyone is aware it's a complicated document. But I do think that it would create a new set of options. While I understand and appreciate the Board's interest in wanting to add this.

It actually might not make the most sense to do it here, maybe the allocation section would be better. With that understanding, you know the Plan Development Team could move forward with drafting up that subsection and add it to the allocation section, so that it's clear there what that would mean.

MS. KERNS: I mean I think either way it doubles the number of options, wherever you put it, it does do that. I just want to make sure it's clear to everybody that that is what will happen to the document.

CHAIR BELL: Yes, we're kind of going in that direction. But I understand, I mean people are trying to get this right. That is the effect of that. At this point, is it the pleasure of the Board to direct staff to work on that? Is that the direction we want to go?
MS. KERNS: I have Justin Davis and Jesse Hornstein.

CHAIR BELL: Okay, Justin.

DR. DAVIS: As the one that sort of opened this can of worms today to start with. Just my advice after listening to all the discussion is that there should just be extra verbiage in Section 3.1.1 that makes clear that unless the Board takes action like adopting Option 2 in this section or Option 3 in the incidental catch small scale fishery section, essentially options that create a new set aside or increase an existing set aside, that by default whatever quota is freed up by a new minimum allocation scheme will be allocated out, according to the strategy in 3.1.2.

I think it just should also be clear, my understanding is that the Board could select Option 2 here and increase the set-aside for the episodic set-aside program, even if we kept the status quo minimum allocation scheme. Like it's not necessary to select one of the new minimum allocation schemes to free up quota to allow an increase to episodic set-aside. The two things are independent, if I'm understanding it correctly.

MR. ROOTES-MURDY: Yes, that's correct.

CHAIR BELL: Okay, so perhaps some additional verbiage at this point, rather than going through the whole evolution of creating a whole bunch of more options. Okay, Jesse.

MR. GILMORE: Actually, it's Jim Gilmore Hornstein again. It wasn't on this, so I didn't have a comment on the current discussion. I had another thing I wanted to raise though, if you want to finish this first and come back to me it's fine.

CHAIR BELL: Yes, if you don't mind, Jim, let's go ahead and move on this point. To Justin's point about perhaps we could address this through some additional clearer verbiage that would help people understand. It might avoid the doubling options and that sort of thing. Does that make sense, Kirby?

MS. KERNS: I have Lynn Fegley with her hand up.

CHAIR BELL: Okay, Lynn, go ahead.

MS. FEGLEY: I agree emphatically with Justin, because it seems like doubling the number of options is the last thing you want to do, and it's going to be pretty hard for the public to track that. If we can do it just with some clarifying language on the default state of that quota, unless the Board takes action or some such thing. I think that would be super good.

CHAIR BELL: I think at this point. I mean this isn't up to me, but I kind of like the idea of clarifying language. It would just be, you know does Kirby feel we have had enough discussion here, and what our intent is for them to basically be able to develop the language. I want to defer to Kirby. Do you think you have enough from us to understand what it is we're trying to get you to kind of work on, in terms of clarifying? Well, not you necessarily. But the development of some clarifying language.

MR. ROOTES-MURDY: Yes, I think so. Also keep in mind, we do have some Plan Development Team members listening as well. I think that is something this group can work towards, and have some language written up. That being said, if there is suggested language the Board members want to send back after this meeting, we can definitely work off of that, then put it in your document.

CHAIR BELL: We're still under the heading of 3.2. Anything else?

MS. KERNS: Jim Gilmore.

CHAIR BELL: Okay, Jim.

MR. GILMORE: Question to Kirby. Did the PDT discuss the issue about individual state caps on the episodic event, because basing it on the history of this when we first started it? The episodic event was the 1 percent, and we used very little of it. As time went on, it became more and more of a need, and actually New York got into it later, and the first year we were in it, actually New York got a cap for that first year.

A little bit later we checked into using the episodic event, and essentially it had said, well it was on gone. One state had taken the entire episodic event cap or the episodic event quota. At that point it was like, well this is kind of, we essentially have a race to fish on it now. Now that I see that it was a suggestion that we add other states into it. Probably at this point, so two parts of a question. Did the PDT consider anything about putting caps on its bait, and if they haven't, I mean, and it's something maybe we want to talk about, because if you're going to have now all 15 states going after the episodic even, I'm sorry, 5 states. No, no, it was a question.

I'm sorry, I think there was a suggestion that we add the southern states into the episodic event quota. If we're going to do that, do we need to consider having a cap on what a state could take? Obviously, if they take that cap and then there is left over from the other states you can still share that. But that's something that has become an issue in the past. Anyway, Kirby.

MR. ROOTES-MURDY: While the group discussed how to best account for different states landing different amounts under the episodic. There was no discussion where you could see explicit options in there about capping any state, in terms of their ability to land on the quota.

I would say if there was an interest in doing that or increasing the states that can participate. You know we need to get that guidance on the record. I think ideally it would be a motion so it's very clear to everyone what is being added there, in terms of how the episodic program would change moving forward potentially in this document.

CHAIR BELL: Is there a desire on the part of the Board to do such, or necessary?

MS. KERNS: I have no Board members with their hand up.

CHAIR BELL: Okay. Well, we've had a lot of discussion on it. Okay, then we're still in 3.2.1. How about anything related to 3.2.2, two options there? Any other motions related to this section, I guess is what I'm saying at this point. If we could kind of get this section that would be great.

MS. KERNS: No hands for episodic, let's move on.

CHAIR BELL: Kirby.

MR. ROOTES-MURDY: We have those changes noted that we will adjust by the Plan Development Team's work. We'll move on to the last section in this document, which is the Incidental Catch and Small-Scale Fisheries Provision. Again, the objective for this is to sufficiently constrain landings to achieve overall management goals of meeting the needs of existing fisheries, reducing discards, and indicating when landings can occur, and if those landings are part of the directed fishery. There are five subsections here.

I'm going to try to go through them as quickly as I can, so that you guys have the information and then we'll get to the Plan Development Team recommendations. First is the timing of the incidental catch provision, as you all remember. There was a request to have a set of options that makes more clear when a state can move into landing under this provision.

Option 2 lays out that a sector, specific fishery or gear type within a state, once they've met their sub-allocation could go into the incidental catch and small-scale fisheries provision. Option 3 specifies that a state can only move into this provision once their state allocation is met, and Option 4 is the full closure of the state's allocation that's the no incidental catch and small-scale fisheries provision would continue. It would do away with this in the management program. The next subsection is

permitted gear type. There are two options in here that move beyond the status quo.

Option 2 would outline that no purse seine would be allowed. All other small scale and non-directed gears would be maintained. Provision would apply to both of those categories, and for more information on the gear types specifically that would be allowed, please refer to the document. Please note that under this option as well landings from the purse seine gear would count against the state's directed fishery quota. Then Option 3 is to make this only non-directed gear. Again, under Amendment 3, what this means is that gear types, just pound nets, anchored, staked gillnets, drift gillnets, trawls, fishing weirs, spike mats and floating fish traps would count towards this.

Next section is 3.3.3, the trip limit for the directed small-scale fishery. To clarify here, based on the last Board meeting, there was an indication to reduce the trip limit for the directed gear type. Option 2 would reduce it down to 4,500 pounds, and Option 3 offers to reduce it down to 3,000 pounds. Please note that for the non-directed gear types that trip limit would remain at 6,000 pounds.

The next subsection is the catch accounting, and we have three options here that differ from the status quo. Right now, under status quo, the landings do not count against the state's quota or the total allowable catch. Option 2 would create a catch cap equal to 1 percent of the TAC. The cap is not a set-aside, and landings would still not count against the TAC.

The way this would work is that if reported landings exceeded the cap by 10 percent in a single year, or two years in a row, regardless of the percent overage, the management trigger would be reached, and the Board would need to take action to reduce incidental in small scale fisheries landings. Option 3 would create a 1 percent set-aside of the overall TAC, similar in terms of a set-aside like the episodic event set-aside program.

If the set-aside were to be exceeded in a given year, that overage would be deducted on a pound for pound basis for the next subsequent year set aside. An overage from 2022, as of right now would be applied in 2024. Option 4 creates a provision where total landings, which include incidental catch, directed fishery landings, and the episodic, would be evaluated against the TAC, and it's in combination all of those moved landings above the TAC an overage was deducted on a pound for pound basis for the next year's TAC, similar to Option 3.

Our last subsection is to allow access to the episodic even set-aside program at less than 100 percent of a state's allocation. Option 2 here qualifies the states to begin fishing once they've landed 95 percent of their quota. Again, the thinking here is the 5 percent reserve of a state's allocated quota could then be used once the episodic even set-aside program had closed, and allow states to remain operating under the directed landings, rather than going directly into incidental catch and small-scale fisheries provision. The last thing I was going to note on my end is Plan Development Team recommendations regarding these subsections. The PDT recommends removing the catch accounting section, primarily around the concerns of timing when accountability would occur, and the potential that it could create new problems, especially around provisions of pound for pound payback.

Additionally, in trying to address accountability, in the sense of reducing landings in this category. The PDT notes that that objective could be reached by adjusting the trip limit, the timing of when states can enter into the provision, as well as the permitted gear type. Last, the PDT recommends removing the option that allows access to the episodic event set-aside program at less than 100 percent of the state allocation.

They noted concerns over the fairness of this provision, given 5 percent for one state is not the same, in terms of poundage for another state. Similar to the previous recommendation, the goal of trying to allow states to use more quota for their directed fishery could be achieved through revised allocation. I'll turn it over to Meghan for the AP report.

CHAIR BELL: Thanks, Kirby, go ahead, Meghan.

MS. LAPP: The AP discussion on this section focused primarily on concern about the current language regarding purse seines being allowed to be considered small scale. Folks sited the specifications allow for greater catches than 6,000 pounds, and they also suggested to include in the Addendum a breakdown of state-by-state information on seine size limits and regulations.

That was primarily because the size of small-scale purse seines allowed by the incidental catch in small-scale fisheries is the same size purse seine allowed by some states for directed fishing. There was a desire to put more context of that discussion in the actual document.

CHAIR BELL: Were there PDT recommendations, Kirby?

MR. ROOTES-MURDY: Yes, I just went through those before Megan went. The next slide just has a breakdown of all those options for the Board to consider if they want to remove anything.

CHAIR BELL: We've had Kirby's overview, we've had the PDT recommendations, we've had the AP input. This would be the point where the Board members questioned. I don't see us, in the time we're going to have, really getting into doing anything with this today. I don't really see us getting all the way through. Any questions right now related to anything, while we have Kirby, and the ability to ask questions from Board members.

MS. KERNS: Mr. Chairman, I think it's okay if we entertain a couple motions that might not involve some PDT work, because I would like to try to make sure. You know the document is n0ot going to move forward today, but there are some things that the PDT need to work on, and I would really like to be able to get that done between now and May, so that there doesn't need to be delay after that.

CHAIR BELL: That's fine with me. I'm happy, I was just watching the clock and remembering one o'clock comes.

MS. KERNS: If Bob and Spud are not okay with that, they can overrule me.

CHAIR BELL: Okay, well then questions or if there are no questions, then are there things that we can do, in terms of motions that would help us, again give guidance, steer the PDT in the right direction to come back and then improve the document?

MS. KERNS: I have Megan Ware, Lynn Fegley, Conor McManus, and Rob LaFrance.

CHAIR BELL: Go ahead, Megan was the first one, go ahead.

MS. WARE: This is a question for Kirby. My question is on Option 4 in the catch accounting section. My question is, I'm curious if the PDT discussed how this option in the pound for pound payback interacts with existing pound for pound paybacks in Amendment 3. Specifically, as the option is currently written it's broad to total landings.

I think there is a situation here where you could actually have an overage of the TAC, caused by an overage of the episodic, then you could have no incidental small-scale landings. This would trigger a pound for pound payback of the TAC. However, in Amendment 3, we also have a pound for pound payback of episodic overages of that set-aside.

You would actually have a situation where two accountability measures have been triggered, and it's unclear to me which one would actually apply. The same situation would apply for state quota overages. I'm curious if the PDT discussed the interactions of these different accountability measures.

MR. ROOTES-MURDY: Thanks, Megan for your question. You know, I will say we didn't get into great details on this. I mean largely because, to get to a point where a TAC is exceeded by all three components, right, directed quotas being exceeded, episodic event set-aside being exceeded, and incidental catch causing in combination those few other things that go with the TAC. It's just a

scenario that we haven't had to deal with in recent years. That's kind of Part 1 of this.

There have been maybe overages of a state's quota, but in those instances, there are usually transfer that is made to accommodate that, the same with the episodic. There wasn't anything that was discussed that I can recall, specific to this option that would set it as a specific percentage. I think it's a fair point to bring up that there may be a need to investigate if there is an overage of the TAC. Is it all three of those things had overages, or was the incidental catch and small-scale fisheries landings truly what caused it to go over?

MS. WARE: Thanks, Kirby. My sense of what the Board is focused on here is, you know we have accountability. We have pound for pound payback for state quota overages. We have it for episodic, and we don't have it for incidental catch small-scale landings, and my sense from the Board if that's where the concern is. I think it may behoove Option 4 to clarify the language here, so it's actually specific to the incidental catch small-scale landings causing the TAC to be exceeded, and that's when you would get a pound for pound payback of the TAC. Because I think otherwise, we could end up in a situation where we have accountability measures that maybe aren't speaking well to each other, or are in conflict with one another. I totally agree that we haven't been in a situation where we've gotten close to the TAC yet, just trying to set us up well for the future. If you want a motion on that I can make it, or I can sit back in line and wait for others.

CHAIR BELL: Let's get a couple more questions, Megan, and then we can revisit that perhaps really quickly. Toni, who did you have next?

MS. KERNS: Lynn.

MS. FEGLEY: Mr. Chair, I was going to throw a motion up, so I'll hold until all questions are done.

MS. KERNS: Conor is next.

CHAIR BELL: Okay, go ahead, Conor.

DR. McMANUS: My comment speaks to perhaps the document at large. I'll hold off on that now, if we can come back to some comments on that later.

CHAIR BELL: You had one more.

MS. KERNS: Two more, one Rob LaFrance.

MR. LaFRANCE: I just wanted to sort of follow up on what Megan Ware had said. I do think being on the working group and working with other folks on all of this really important work. The issue about how we're going to do the accounting visa Vis the TAC is critically important. The idea of taking out this whole section is something I don't think we should be doing.

I'm happy to hear Megan looking for clarifying language in that particular area. I guess I just wanted to maybe ask Kirby and the PDT, why do they feel, I got the sense from their report they thought this was too complicated. It seems to me that it's a complication on top of something else. I just wondered if you could speak to that, Kirby. Why do you feel it needs to come out?

MR. ROOTES-MURDY: I mean the PDT's points were really that if the accountability that the Board is interested in, which I believe is that landings in this category should be decrease, and there is concern about the trend. That that could be achieved through the other subsections in the document. This may create more complexity in how we manage the fishery than we currently have.

That being said, you know it's at the discretion of the Board if you all feel that this section is important, and that there are options that need to be included in it. I think the other thing that is a little challenging is just whether it could create new problems, in terms of the diminishing set-aside, if there are overages of that set-aside. Then also, specification on the timing of when those accountability measures would kick in.

MR. LaFRANCE: Just a follow up, if I might, Mr. Chair. What I'm hearing you saying though, Kirby. You're basically saying that where some of the

other approaches we have in the document could solve what we're concerned about. But what if those other proposals sort of stay in? In other words, people still want to stick with the episodic event and small-scale fisheries, or other things. That's part of the reason I want to see this included and maintained, because it gives more flexibility, in terms of dealing with those issues. But thank you for your comments.

CHAIR BELL: Any other hands for questions from Board members, Toni?

MS. KERNS: Allison.

CHAIR BELL: Okay, Allison.

MS. COLDEN: I think Rob covered a lot of the points that I wanted to make. To elaborate just briefly. I think this document has the intent to reduce the amount of latent quota and the reallocation that we're doing has the intention, or hopefully intention of getting us closer to the coastwide TAC, which is why I think having these accountability measures in there is important. Because no, we haven't gotten close to or exceeded the TAC, even including incidental catch and small-scale fisheries landings over the past few years.

But if the goal is that all of the other measures in this document would get us closer to achieving that number, then I think it's even more important that we have these accountabilities and backstops in there. At the end of the day, if things come to pass with this document that puts things more towards directed allocations in the state-by-state quotas, then having this in there shouldn't be a problem, because it shouldn't trip if we get closer.

But as Rob said, at this point in the process we have no insurances of what the outcomes of the other parts of the document are going to be. I think it's prudent to keep at least some of the options in here. I did have a question for Kirby related to the PDTs concern on the timing of payback. There are payback provisions for other parts of the management program, so I'm just wondering, do they have the same type of payback schedule, and if that's the case, why there aren't concerns about how long it takes to pay back a state allocation or an EESA overage.

CHAIR BELL: Kirby.

MR. ROOTES-MURDY: Thanks for the question, Allison. I'll speak to episodic event set-aside payback, as well as the directed fishery quota. What we have in the episodic program is in-season monitoring, where in coordination with the state we are monitoring that set-aside program.

We know in-season if there has been an overage of it, based on those preliminary landings, and in turn we can notify the Board, and that can be adjusted for the next fishing season. When it comes to directed fishing quotas, we also with the compliance reports get notice from the states whether they exceeded their quota, and in turn that can be adjusted in the beginning of the states, or at least by the spring of that year the state's allocation. I think one of the challenges will be that we would not have, I think clear indication that the incidental catch provision had been exceeded, likely until the spring meeting annually.

If there is a sense from the Board that they would like to have that incorporated, and in turn a further adjustment to state quotas or to what the set-aside program is. At that point in the season that is at the discretion of this Board. But that was the general concern.

CHAIR BELL: In the interest of time, and I'm already blowing past the limits that we had here, and we do have a couple of things we've got to finish up on the agenda. I know two people, both Megan and Lynn had indicated an interest in perhaps make a motion on something in this section, which might hopefully give us, maybe we end up with the PDT needing to do some stuff, helping us to improve the document before we come back to it.

I think it's pretty obvious we're not going to get to where we need to be to take this to public hearing yet. I guess I would ask, I'm not sure how long it's going to take to work through a couple of motions,

so Megan, you mentioned something first. Would that be something you could see us processing here fairly quickly, or should we just wait on that for another meeting?

MS. WARE: I have no clue, Mr. Chairman. I can try, and if it looks like it's starting to tailspin, we can maybe just turn it into a tasking for the PDT. But I sense some just clarifying language on Option 4, for staff to, I think avoid the situation I was talking about, where you have overlapping accountability measures.

MR. ROOTES-MURDY: Yes, just give us a second to get that up on the screen.

MS. WARE: Just so the Board knows, I underlined the language that I'm proposing to be added to this option, just so everyone knows what change I'm proposing. But move to modify Option 4 in Section 3.3.4 to read, total landings under this provision would be evaluated against the annual TAC if incidental catch and small-scale fishery landings when added to landings under state quotas in the EESA cause the TAC to be exceeded, then the overage would be deducted on a pound-for-pound basis from the next subsequent year's TAC**.**

CHAIR BELL: Okay, so there's Megan's motion. Can we get a second to that?

MS. KERNS: I have David Borden.

CHAIR BELL: Okay, David, thank you. Discussion of that. Any further explanation first, Megan, from you? Pretty clear.

MS. WARE: I realize this is kind of a technical point, in terms of the interaction between Addendum I and Amendment 3. But the language as it currently reads is quite broad, and I think we have accountability measures for episodic, we have it for our state quota overages, we don't for incidental catch small-scale provision, and that's what I'm trying to reflect in this motion.

CHAIR BELL: All right, any other discussion of the motion?

MS. KERNS: I don't have any hands from Commissioners.

CHAIR BELL: No discussion on this particular motion.

MS. KERNS: I have one, Lynn Fegley.

CHAIR BELL: Yes, Lynn, go ahead.

MS. FEGLEY: Sorry, I was just staring at this for a while, trying to digest it, which we probably all were. I just wonder if this isn't better. Since we're not sending this document out for comment right now. I just wonder if this isn't better to send off to the PDT to consider and incorporate. I just feel like maybe some of us need to think a little harder.

CHAIR BELL: Yes, I follow you. I'm just staring at it myself, and you guys understand it way better than I the implications of it. Yes, I mean perhaps, I think Megan, maybe of course we're going need the motion, we'll have to deal with it. Maybe it would be better to provide it as guidance to the PDT, and then they can mull it over, come back and craft something, because we're going to be looking at something later anyway. Just my two cents worth at this point.

MS. WARE: Mr. Chair, I understand that, especially given the hour of the day. I'm happy to, if Mr. Borden agrees, just withdraw the motion, but ask the PDT to consider this type of clarifying language.

CHIAR BELL: Okay, you all both okay with that?

MR. BORDEN: That is also acceptable to me.

CHAIR BELL: Thanks, David, and Kirby you have enough then to take to the PDT?

MR. ROOTES-MURDY: Yes, I think we have it clear on the record what you all are looking for.

CHAIR BELL: The other thing, Lynn, you had mentioned a motion, but what do you think? I'm not sure what you had in mind, The group motion is withdrawn, so Lynn, did you have something that

we might just squeeze in here, or provide guidance to the PDT on at this point?

MS. FEGLEY: Thank you, Mr. Chair. I did have a motion to remove an option under the timing provision, and that was to remove Option 4, which basically eliminates the incidental catch and small-scale provision altogether. Because I feel like it's such an important piece of what a lot of states are considering. The accountability measures are in here, so to remove, I just feel strongly like that should not be up for debate at this juncture.

CHAIR BELL: You were going to move to remove Option 4?

MS. FEGLEY: Correct.

CHAIR BELL: Okay, is that something maybe we need to let the PDT mull over?

MS. FEGLEY: Or we could take it up when we consider this document again, it's the pleasure of the Board. If we do that's fine with me.

CHAIR BELL: I'm not trying to direct this, so it's really the Board's pleasure, but I mean at this point making kind of major structural edits might not be the best thing on the fly here, maybe let the PDT reflect on this and then whatever we end up looking at the next time. You all have been able to put a little thought into it, I'm thinking.

MS. FEGLEY: I'm happy to withdraw the motion.

CHAIR BELL: Okay, well yes. That is good. You didn't have a second, so I think we're cool then. Again, sorry to keep bothering you all about the clock. Are there any other questions from Board members for Kirby right now, related to where we are in the process? I think we're going to find ourselves; the PDT is going to be spending more time on this. Something is going to come back to use at the next opportunity. But I don't see us being ready today to go anywhere with it. Any other questions, particularly since we have Kirby right now?

MS. KERNS: I have Nichola, David Borden, and Emerson, and then just as a reminder to you, Mr. Chair. Sorry, David and Emerson have taken their hands down, so I think it's Nichola, and then back to Conor that you said you would come back to him.

CHAIR BELL: Oh, right, thanks. Okay, Nichola.

MS. MESERVE: Given that the PDT is going to be looking at the catch accounting section, and Option 4 in particular for some additional language. I wanted to make another suggestion for possible improvement that the PDT could consider for this section. That would be to structure it as two tiers.

The first tier being that there is some time of trigger that is met regarding the incidental catch in the small-scale fishery landings. The second tier is the response that occurs. The four options here have several different responses, one of them being a pound-for-pound payback, one of them being just direction that the Board must take some action to reduce the landings.

As these options are structured, you know one of those responses is already tied to the trigger, and I have a bit of concern about the pound-for-pound payback response to a trigger being met, because it doesn't address the root cause of the overage, or the increase in those landings. Just at this point in time I just would offer that as a suggestion to the PDT when it's looking at this section again, to see if it could be restructured in a way that would untie the trigger from the response, so the Board would have more flexibility in picking a final option.

CHAIR BELL: Kirby, do we have that in a form that you can make sure the PDT can follow up on that?

MR. ROOTES-MURDY: Yes, absolutely.

CHAIR BELL: Okay, and really quick, Conor, you have a last word on this for us today.

DR. McMANUS: Yes, thank you, Mr. Chair. Question for Kirby, and then comment, I guess. As we look to revise the document and where we are timeline wise like. I wanted to get your take on the

efficacy of 2021 data being available. I think it's two components. One, in terms of describing the state of the fishery and the statement problem presented in the Addendum, is how 2021 data may provide a more accurate picture for what's occurring, particularly based on some of the comments of 2020 and the pandemic discussions.

Then I guess the other question is, if so, how that may or may not interact with some of the other options that we discussed today. Some of them, like the moving average, theoretically would not be impacted by that understanding, but in terms of, in that same section, Option 6 or Option 2, where they're trying to capture what's going on in the recent fishery. I didn't know, I just wanted to try and get some thoughts and comments on that from you, and if time discussion from the Board. Thanks for your time.

MR. ROOTES-MURDY: Yes, thanks for the question, Conor. I would just say, I think it would be very challenging to try to incorporate that into this document. If the Board wishes to take it out for public comment following the May meeting. You know we went through a process starting this time last year to ask ACCSP to validate landings, you know through the time series we've been looking at.

I just think it would be really tough to try to give the PDT enough time to get that data, input it into these options. I would just see it as being a very challenging position to put the PDT in, in getting that document to you all by May. I don't think it would be possible if I was still chairing it, but that's just my two cents.

CHAIR BELL: Yes, we need to conclude this. They are about to grab the hook and pull me off the stage. I would like to offer one minute for a public comment. I promised public comment at appropriate points. I think we have one member of the public who would like to comment. We can provide a minute for that, and then we need to roll on to the last couple of items we've got to finish quickly here on the agenda.

MS. KERNS: Maya, if you could get that clock up that would be great, thank you, and Tom, go ahead.

MR. LILLY: I'm asking the PDT to back up here and use the socioeconomic information in your allocation decisions, not just to store data. A section of the charter, it says you must use that data to how important it is in a fish management plan. All those numbers are readily available.

Comment, taking 25 percent of the entire TAC in Chesapeake Bay benefits a small number of people in Virginia, but it impacts millions of people, and tens of thousands of businesses on the Atlantic. One million children that fish on the Atlantic are being impacted. Amendment 3 in the Charter requires that you consider the impacts to Maryland and the states. That is what you should be doing, and that is what we are asking you to do. Thank you.

CHAIR BELL: All right, thanks, Tom, appreciate that.

REVIEW AND POPULATE ADVISORY PANEL MEMBERSHIP

CHAIR BELL: Okay, Kirby, it's back to you for the kind of the flow of everything. One item that we had next on the agenda is to deal with AP membership. I guess that's Tina, we need to approve some AP nominations, is that correct?

MR. ROOTE-MURDY: That is correct.

CHAIR BELL: Okay, Tina needs to roll in here?

MR. ROOTES-MURDY: If she's unavailable, I can go ahead and make that. We received two nominations in supplemental material, Michael Dawson of Maine and William Caldwell of New York to be nominated to the Atlantic Menhaden Advisory Panel.

CHAIR BELL: All right.

MS. TINA L. BERGER: Sorry about that. I wanted to say, I'm sorry if you discussed this already, but the nomination of William Caldwell from New York is an

addition to their current member, so I just wanted the Board to be cognizant of that. Also, in the correspondence that was provided on William Caldwell, identified him as a purse seiner, and he is an inshore beach seiner. Thank you.

CHAIR BELL: Okay, thanks, Tina. That's a motion that a member would need to make, that's not a motion from a committee? Am I right?

MS. BERGER: That's correct, a Board member needs to make that.

CHAIR BELL: A Board member be willing to make that motion to nominate Michael Dawson and William Caldwell to the Advisory Panel.

MS. KERNS: I have Jesse Hornstein and Justin Davis.

CHAIR BELL: Okay, which is actually Jim.

MS. KERNS: It is actually Jim, every time I just see the name, sorry.

CHAIR BELL: We have a motion and a second. Discussion? Any objection to the motion.

MS. KERNS: No hands raised in objection.

CHAIR BELL: Then seeing none, then that motion carries. Thank you very much, by unanimous consent there.

ELECT VICE-CHAIR

CHAIR BELL: The next agenda item is very important, **to** elect a Vice-Chair. Do we have a nomination from anyone for a Vice-Chair for the Menhaden Management Board?

MS. KERNS: I have Eric Reid with his hand up.

MR. ERIC REID: I would like to move to nominate Dr. Conor McManus from Rhode Island as the Vice-Chair of the Atlantic Menhaden Management Board.

CHAIR BELL: All right, thank you, Eric, get a second from a Board member. Any hands?

MS. KERNS: Yes, Megan Ware.

CHAIR BELL: Megan, thank you. We have a motion to nominate Dr. Conor McManus for Vice-Chair of the Menhaden Board and a second. Any discussion? Any opposition?

MS. KERNS: No hands.

CHAIR BELL: Conor, if you want to raise your hand, I wouldn't blame you buddy. **All right, thank you, then that motion is passed and Dr. Conor McManus will be our Vice-Chair for the Menhaden Board, and thank you very much, Conor for being willing.** This will be fun. Good. That order of business out of the way.

OTHER BUSINESS
STOCK ASSESSMENT SUBCOMMITTEE MEMBERSHIP

CHAIR BELL: We had one other thing, right that we were going to add. Kirby, you had a slide or something you were going to throw up related to stock assessment.

MR. ROOTES-MURDY: We wanted to show the Board the Stock Assessment Subcommittee currently, in terms of its membership. I think I sent that over to Maya yesterday. We just want to make sure that the Board is aware of the current membership. We had a couple changes in terms of people, one that we lost, one that we added on, so making sure everyone is understanding those changes.

MS. KERNS: Kirby, if Maya doesn't have the slide up, if you could just verbally tell the Board those changes.

MR. ROOTES-MURDY: Yes, sorry, I thought I, oh, there it is. Yes, Amy Schueller is our Chair of the SAS, Joey Ballenger, Jeff Brust, Matt Cieri, Micah Dean, Brooke Lowman, is a new hire from Virginia, Jason McNamee, with Rhode Island, Ray Mroch,

NOAA, Josh Newhard is our TC Chair from U.S Fish and Wildlife Service, Alexi Sharov, Chris Swanson, and ASMFC staff.

CHAIR BELL: All right, this is just for informational purposes. That is your Stock Assessment Team there. Any questions? I don't think so. Kirby, anything else, or Toni, that I have forgotten?

MR. ROOTES-MURDY: I'll just say there is one other thing, give me 30 seconds. Before we adjourn, I just wanted to take one moment of your time, I'll be quick. I'm grateful for the experience I've had working with you all over the years, and I've received messages over the last few weeks from many of you, and have appreciated them greatly.

In those messages there has been praise and complements, and it's important to know that so much of my work has been through collaboration and support from you all, my colleagues. My fellow staff members at ASMFC in particular those in the ISFMP and Science Departments are some of the smartest and dedicated people I've been fortunate to work with. Please, continue to let them know how amazing they are. I'll end with this. Life is short, and I have learned over the last few years the importance of letting people know how much they mean to you, so one last time, thank you all! I look forward to working with you in the future, and hope to see you soon. Take care!

ADJOURNMENT

(Whereupon the meeting adjourned at 1:00 p.m. on January 27, 2022.)

From: Robert T Brown
To: Comments
Subject: [External] Atlantic Menhaden Board Comment
Date: Thursday, April 14, 2022 10:41:15 AM

Menhaden allocation should stay at status quo for the fishery. Some States have an episodic event, so they cap harvest of menhaden plus small vessel set aside of 6,000 LBS. per day for 12,000 LBS per day with 2 licenses aboard the vessel. There is no reason for other states to have a cut in quota.

Thank you
Robert T. Brown, Sr

Proxy Commissioner
Russell Dize - Maryland

From: Tom Lilly
To: Tina Berger
Subject: [External] Fwd: Comments for Menhaden Delegates
Date: Friday, April 8, 2022 11:38:33 AM
Attachments: Allocation Law.pdf
2022-0301 All Testimony Regarding SJ6.pdf

Tina could you please post these comments in the materials for the Spring meeting and send me a receipt when you get a chance?

Subject: Comments for Menhaden Delegates and staff

To ASMFC Menhaden Board, menhaden TC and PDT and Policy Board..and ASMFC staff..... The October menhaden board minutes remind me of 2009 when the board was advised by Dr Maguire that it wasn't necessary to do more research .... they could prevent the "negative consequences" to Bay wildlife from menhaden depletion by using time and area controls on the factory fishing. He was referring to moving the factory fishing out into the US Atlantic zone which advice was followed by NY, NJ and NC (if I remember correctly) leaving only Virginia allowing it and further concentrating the fishing in Chesapeake Bay. In our view the inaction by the Commission since 2009 has played a major role in the "negative consequences" described in the endorsements , scientific reports and testimony for Resolution 06 attached. Nine years after Dr Maguire's advice Director Beal reminded the board what Dr Maguire said and of their duty to make management decisions on the Bay under the Precautionary Principle due to the poor condition of Bay wildlife. That was nearly 3 years ago. Charter Section 6 (a)(2) says management decisions are to be made on the " best scientific information available" .

I heard references in the minutes to the Rhode Island plan that protects the seasonal rebuilding of the menhaden forage base using simple spotter pilot surveying and prohibiting purse seining until the base is rebuilt. As you know efforts to design and fund Bay aerial and/or acoustic surveys or to model the Bay have never met sucess just as Dr Maguire discussed. The Bay "cap", unfortunately, does nothing to protect the forage base rebuilding as 8-10 purse seiners target the spring menhaden with capacity to catch two or three times the volume of fish coming into the Bay. This is one of three prongs of the problem , the others are the fact Omega catches 1,000s of schools that are on their way to our Maryland Bay wildlife... the other is in protecting the Bay forage base once established. All three

problems can be solved by just moving the fishing into the US Atlantic zone.

The board has a number of options here. There is plenty of scientific opinion that depletion is harming the spawning stock and ospreys.There have been prolonged declines in all recreational, commercial and charter fishing in the Maryland bay. See testimony. This is having economic consequence in the hundreds of millions of dollars and social consequences in denying the pleasure and health benefits of recreational fishing and enjoying Bay wildlife to many millions of adults and children. The emerging science on the mental and physical health benefits of nature based leisure time and recreational fishing will be forwarded to you, the PDT and the TC. We are talking about comparing benefits to Omega versus to the Bay's 4,000 square miles of wildlife, many millions of adults and children and to tens of thousands of businesses from just having the factory fishing take place in the US Atlantic zone. No lost jobs or quota.

This comes down to the board members following Charter Section six and determining whether continuing the factory fishing in Chesapeake Bay is in the best ecologic, social and economic interests of the people of Chesapeake Bay and the Atlantic Coast based on the best available information , This is what Section six (a) of the ASMFC Charter requires . The board has many other options...for example, applying the Atlantic ERP maximum commercial menhaden "extraction rate" of -4% to Chesapeake Bay. The board could allocate the number of fishing days to the factory fishing in a way that insured they were not exceeding the 4% extraction rate. This would result in a fair, effective and enforceable solution to this problem right now. One would suggest the Bay where the threatened spawning stock is active should not have a higher extraction rate than the open ocean.

Please look behind the statistics here and think about the wise use of the most important natural resource our wildlife have...their food supply. Think about the millions of adults and children on the Bay and Atlantic coast that would benefit immediately by just having Omega fish in the US zone. I see from the minutes over many years that Chesapeake Bay is on your conscience. Good thoughts and intentions are fine , that has been going on for almost 20 years now . It is action the Chesapeake Bay needs now, the support for this in Maryland is demonstrated in the million and four hundred thousand Marylanders who personally or by representation are asking for action as described in the below mail and the testimony on Senate Resolution 06.(scan). will you please start that process? Respectfully Tom Lilly menhadenproject 443 235 4465

PS
Dr Maguire's and Director Beal's comments are at page 3-4 of the Ross Letter,,, Google menhadenproject.org for text and CBF diet studies....menhaden from 70% to 8% fish diseased and malnourished etc. widespread osprey nesting failures..chick starvation..due to menhaden depletion....see William and Mary College Center for Conservation Biology report etc

-----Original Message-----
From: Tom Lilly <foragematters@aol.com>
To: lynn.fegley@maryland.gov <lynn.fegley@maryland.gov>
Sent: Mon, Mar 28, 2022 9:30 am
Subject: Fwd: Senate Resolution 06 Testimony

Lynn

I thought you might be interested in looking over the written testimony and public comments on State Senate Resolution 06 from the EHE hearing March 2nd. This was an effort to bring to your attention the importance of asking the ASMFC whether to continue the factory fishing in Virginia and then to urge that board to base their menhaden allocations to Virginia on the ecologic, social and economic impact/benefits of the factory fishing on the Maryland Bay and Maryland public. (as required by Charter section 6. scan allocation law). The current state reallocation process that is based entirely on historic landings is not following the law and is ignoring what is in the best interest of the ecology of Chesapeake Bay and the social and economic interests of many millions of Marylanders. There was no public opposition to this Resolution but the Chair of the EHE committee Sen Paul Pinsky, did not allow it to come to a committee vote. If there was opposition to this Resolution it was behind closed doors so the proponents were not given an opportunity to rebut what was said.

Lynn, please review the endorsements of Maryland Sierra Club and Shore Rivers that represent 73,000 Marylanders concerned with the environment and conservation. Also the information letter from DNR ....The

Legislative Sportsmen's Caucus adopted the opinions of Dr Noah Bressman which supported spatial changes in the factory fishing. (that is requiring the factory fishing be in the US Atlantic zone only as every state but Virginia does) The Caucus members are the legislators concerned with protecting our Maryland hunting and fishing traditions..they represent over a million constituents. Ten state wide fishing club leaders endorsed the Resolution. We believe they represent at least 300,000 Maryland anglers and 100,000 children who would love to see fishing improve, While all Charter captains were not polled the Solomons Charter Captains and all the Charter Captains fishing out of Wenona (Deal Island) endorsed this. We think these captains represent the charter clients that would be fishing more if fishing improved. From 2009 to 2019 charter trips decreased from 17,000 to 10,000*. With the usual 6 customers a trip this is at least 42,000* absent fishermen a year who I am quite sure would want to see better fishing. There are only half the charter businesses in Deal Island and Crisfield that there were 10 years ago. The anglers, conservationists, the Sierra Club, Shore Rivers,the charter captains and the Legislator's constituents that add up to over one and a half million Marylanders, by representation, that want the ASMFC to do its job and decide the merits of the Virginia factory fishing controversy after allowing all parties be heard. I would be glad to discuss this further or listen to your comments.

Thanks for your attention Tom Lilly menhadenproject.org 443 235 4465

* numbers need verification

Statement of Charter and Amendment 3 provisions on the allocation process:

Under the ASMFC Charter and Amendment 3 Fish Management Plan state allocations are to be based on determining the comparative benefits, ecologically, socially and economic, between removing the menhaden from the water for the benefit of the purse seiners or leaving the menhaden in the water to benefit the Atlantic ecosystem and its people, it's fishermen and businesses. There is no mention of basing these allocations on historic landings. Doing so just ignores the Charter and Amendment 3.

Charter Section Five (c) (3) states:

In carrying out its activities, the PDT shall seek advisement from the Committee on Economics and Social Sciences. Charter Section 5 (n) (1) Provides.... Among its duties for the Commission, CESS shall;

1) Develop and implement mechanisms to make economics and social science analysis a functioning part of the Commission's decision making process.

Charter Section Six provides standards and section (a) is relevant here, if provides:

The Commission recognizes that an effective fish management program must be carefully designed in order to fully reflect the varying values ,,,,that are important to the various interest groups involved in coastal fisheries. Social and economic benefits and impacts must be taken into account.

The required calculations are not only of the benefits to Maryland of decreasing menhaden fishing in Virginia (including eliminating allowing Omega to catch part of its quota from schools of menhaden migrating to Maryland) but to consider the impacts or detriments to the people of Maryland, their wildlife and businesses of Omega removing 5,000 ten ton schools of menhaden from the bay food chain each year over the last decade.

JACK BAILEY
Legislative District 29
Calvert and St. Mary's Counties

Judicial Proceedings Committee

THE SENATE OF MARYLAND
ANNAPOLIS, MARYLAND 21401

Annapolis Office
James Senate Office Building
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District Office
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23680 Three Notch Road, Unit 101
Hollywood, Maryland 20636
240-309-4238

March 1, 2022

Senate Joint Resolution 6 – Atlantic States Marine Fisheries Commission – Atlantic Menhaden – Prohibition on Commercial Reduction Fishing

Dear Chairman Pinsky and Members of the Committee,

I am writing to introduce Senate Joint Resolution 6 – Atlantic States Marine Fisheries Commission – Atlantic Menhaden – Prohibition on Commercial Reduction Fishing. This Joint Resolution recommends that, in order to maintain a sustainable Atlantic menhaden fishery, the Atlantic States Marine Fisheries Commission consider prohibiting the commercial reduction fishing of Atlantic menhaden, primarily the use of purse seines and spotter planes, in the Chesapeake Bay.

The policy changes requested by this resolution would prohibit the large vessels owned by a foreign country from overharvesting the bait fish that are vital to the future of our fish populations in the Bay as they have done in the past. While this form of fishing is illegal in Maryland, it is still permitted in our neighboring Virginia waters of the Chesapeake Bay. Reduction fishing in the Bay is done by the Omega Fish Oil Company, which used to be a Virginia-based company but was sold to Cooke, Inc., in 2017 for $500 million. Omega currently has eight fishing boats that work in the Virginia portion of the Chesapeake Bay. The reduction fishery has the ability to take 26% of the total Atlantic Coast menhaden quota from Maine to Florida from the Chesapeake Bay. This poses a substantial threat to the $6.8 billion dollars in economic impact and the 68,000 jobs that are associated with both commercial and recreational fishing of striped bass. The Chesapeake Bay is the nursery for the Atlantic Coast striped bass and should be recognized as such. The reduction fishery in the Chesapeake Bay threatens the population of fish species like striped bass, trout, drum, shad, and bluefish, all of which have seen alarming trends in their populations.

It is important to be aware that Maryland does not allow this type of reduction fishing, nor the bycatch allowed with reduction fishing in Virginia. Menhaden are principally harvested in this State to use as bait for other fish or crabs. Therefore, this resolution would not impact any of our local Maryland watermen, sport fishermen, or outdoorsmen. It is important that the General Assembly recognizes that the commercial watermen, the charter boat captains, and the sport fishermen are on the same page in supporting this resolution.

I respectfully request a favorable report on Senate Joint Resolution 6. Thank you for your consideration.

Sincerely,

Senator Jack Bailey

SIERRA CLUB

P.O. Box 278
Riverdale, MD 20738

Committee: Education, Health, and Environmental Affairs

Testimony on: SJ6 "Atlantic States Marine Fisheries Commission – Atlantic Menhaden – Prohibition on Commercial Reduction Fishing"

Position: Support

Hearing Date: March 1, 2022

The Maryland Chapter of the Sierra Club urges a favorable report on SJ6. This resolution asks the Atlantic States Marine Fisheries Commission to exercise its authority regarding the management of the menhaden fishery to consider prohibiting commercial reduction fishing of Atlantic menhaden, including the use of purse seines and spotter planes, in the Chesapeake Bay.

Atlantic menhaden are a keystone species for the Chesapeake Bay. As noted by this resolution, Atlantic menhaden form a critical connection between the bottom and the top of the food chain. Menhaden are filter feeders, eating plankton and rotifers and helping clear the water of nutrient-pollution.[1] They are also a vital source of food to predators, including predatory fish, dolphins, whales, osprey, and bald eagles. While this is incredibly important to the ecosystem of the Bay, it is also important to the fishing industry. Many species of fish that we harvest from the Bay rely on the menhaden as a food source, including rockfish (striped bass), bluefish, and weakfish.

The Chesapeake Bay is an important nursery for the menhaden that helps sustain the population along the entire Atlantic coast. It is deeply concerning that the number of menhaden juveniles have decreased significantly since 1976 and has stayed low in the last 20 years.[2]

In order to protect the natural wonders of the Chesapeake Bay, it is important that action be taken now. We urge the Committee to issue a favorable report.

Marc Imlay
Endangered Species Workgroup Coordinator
marc.imlay@mdsierra.org

Josh Tulkin
Chapter Director
Josh.Tulkin@MDSierra.org

[1] https://www.vims.edu/research/units/projects/menhaden/research/modeling.php
[2] Durrell, E. Q. & Weedon, C. (2019). Striped Bass Seine Survey Juvenile Index Web Page. DNR.Maryland.gov/Fisheries/Pages/Juvenile-Index.ASPX. Maryland Department of Natural Resources, Fisheries Service.

"THE FUTURE OF STRIPED BASS IN THE CHESAPEAKE BAY AND THEIR DEPENDENCY ON ATLANTIC MENHADEN"

Testimony in Support of
Senate Joint Resolution 6

March 1, 2022

Phil Zalesak
President, www.smrfo.org

* **Microphones off unless speaking during meeting***

MD Recreational Fishing Organizations Supporting Senate Joint Resolution 6

Annapolis Anglers' Club
Atlantic Coast Sport Fishing Association
Frederick Saltwater Anglers
Kent Island Fishermen
Mid-Shore Fishing Club
North Bay Fishing Club
Northwest Fishing Club
Severn River Rod and Keg Club
Southern MD Recreational Fishing Org
Susquehanna Fishing Club

Kevin McMenamin*
Buddy Seigel*
Chris Linnetty*
Bert Olmstead*
Tom Wilkinson*
Stan Cebula*
Mark Kurth*
Skip Zink*
Phil Zalesak*
Jim Cappetta*

* Confirmed by Email

Atlantic Menhaden Harvestiing

Striped Bass Economic Summary For Maryland for 2016

Recreational Fishery Jobs: 10,193

Recreational Fishery Income: $496,859,800

Recreational Fishery GDP: $802,791,200

Comparisons Between the Fisheries

Table MD-8. Comparison of commercial and recreational impacts: Maryland 2016

	Commercial Fishery	Recreational Fishery	Total	Commercial Fishery	Recreational Fishery	Total
Pounds landed (000s)	1,709.4	10,919.1	12628.5	14%	86%	100%
Jobs supported	584	10,193	10,777	5%	95%	100%
Income ($000s)	$12,569.6	$496,859.8	$509,429.7	2%	98%	100%
GDP ($000s)	$17,109.7	$802,791.2	$819,900.9	2%	98%	100%

The Economic Contributions of Recreational and Commercial Striped Bass Fishing, Southwick Associates, page 26, 4/12/19

Science Summary

Chesapeake Bay Contribution to Coastal Stock

"Tagging estimates gave varying contribution rates on the basis of fishing mortality scenarios. Kneebone is the most recent published estimates. In general we can say that Chesapeake contributes >50% and perhaps >60% of the coastal stock" Dr. David Secor, Chesapeake Biological Laboratory, 12/1/20

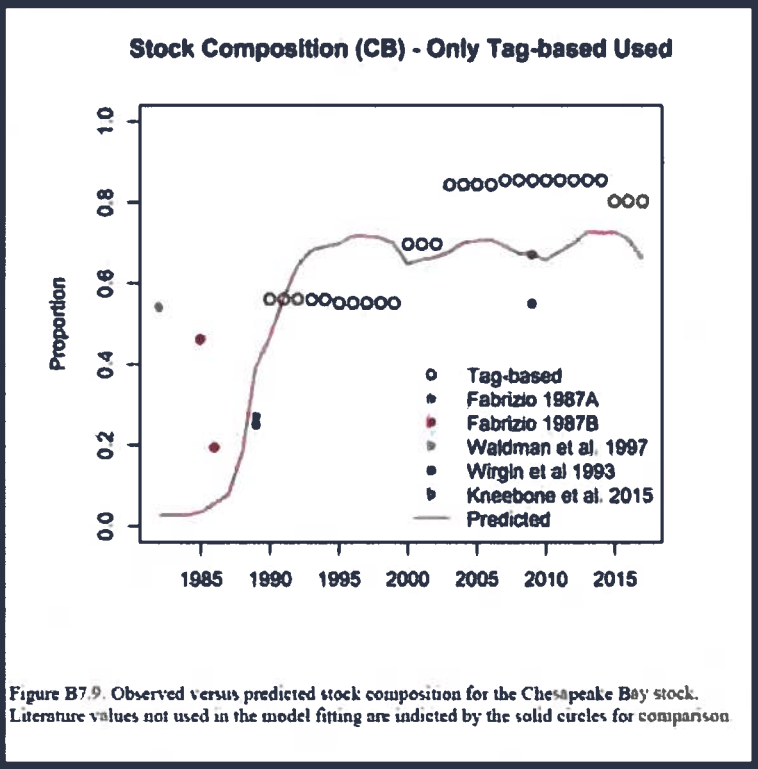
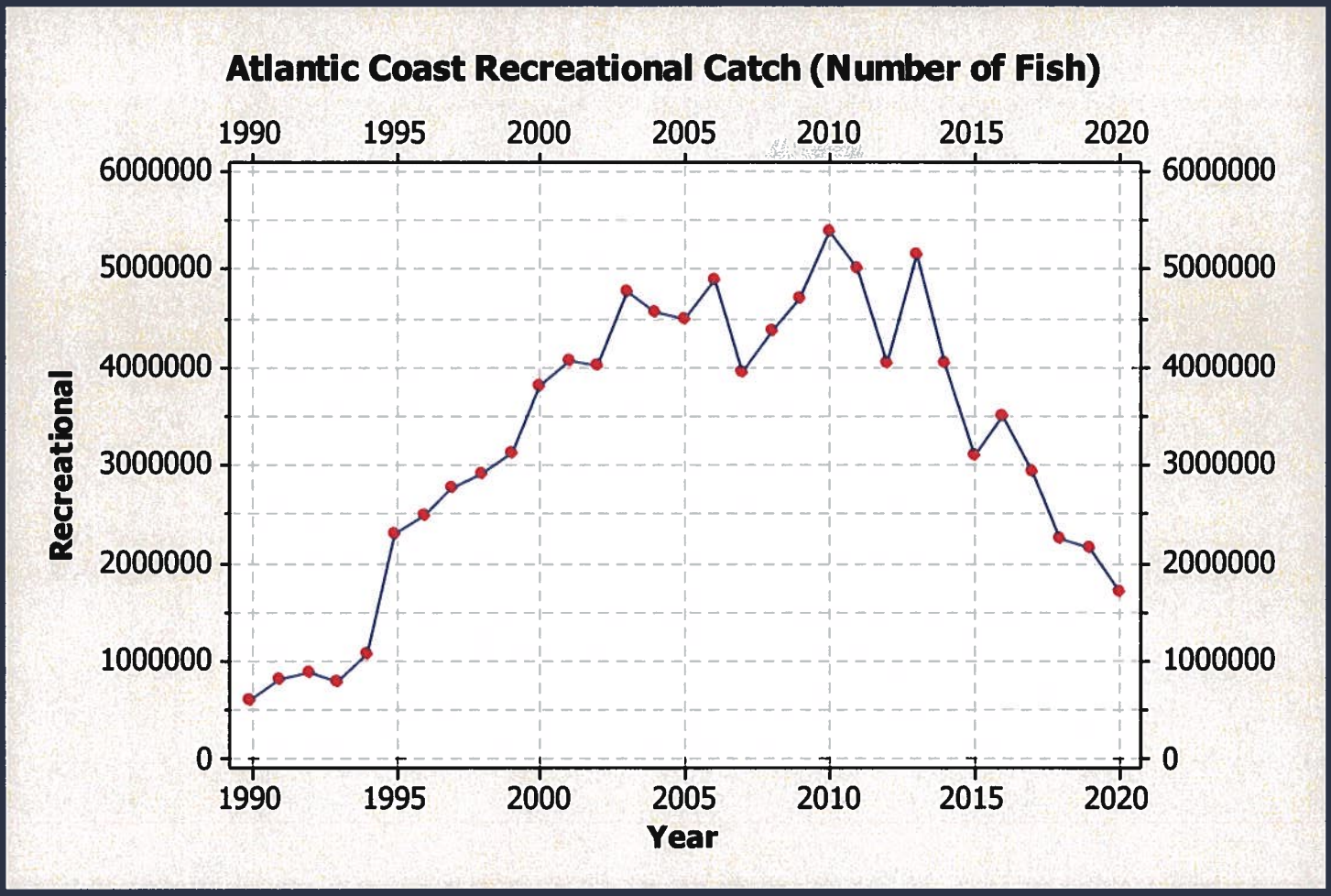


Figure B7.9. Observed versus predicted stock composition for the Chesapeake Bay stock. Literature values not used in the model fitting are indicted by the solid circles for comparison

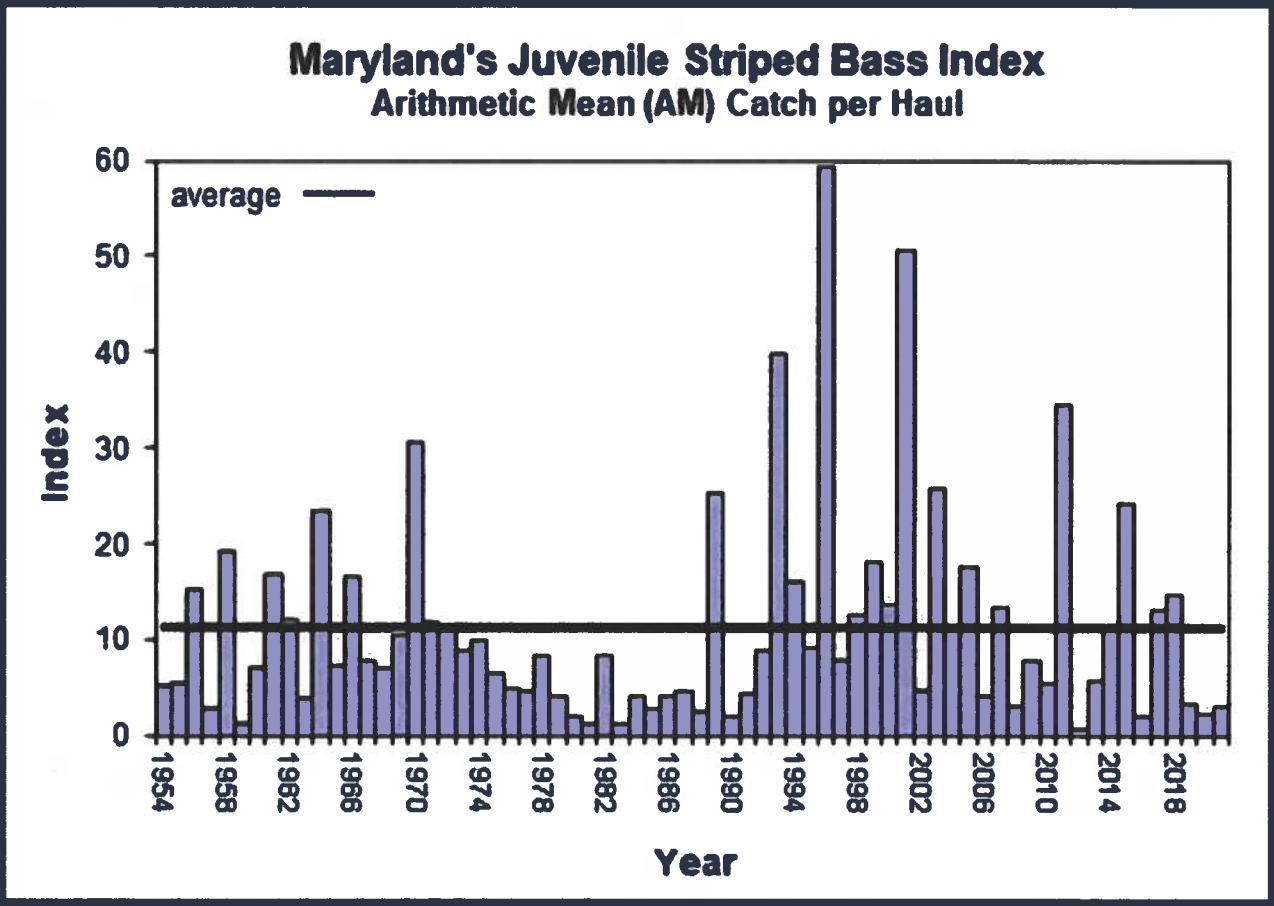
Reference: 66th Northeast Regional Stock Assessment Workshop, April 2019

Striped Bass Recreational Harvest Trend



Ref: Draft Amendment 7 Striped Bass Fishery, Management Plan, page 130 , 2/4/2022

Young of the Year Index



Ref: https://news.maryland.gov/dnr/2021/10/15/chesapeake-bay-2021-young-of-year-survey-results-announced

ASMFC Atlantic Menhaden Allocation

FOR IMMEDIATE RELEASE
October 20, 2020

PRESS CONTACT: Tina Berger
703.842.0740

ASMFC Atlantic Menhaden Board Approves TAC for 2021-2022

The Atlantic Menhaden Management Board (Board) approved a total allowable catch (TAC) of 194,400 metric tons (mt) for the 2021 and 2022 fishing seasons, which represents a 10% reduction from the 2018-2020 TAC level. The 2021-2022 TAC was set based on the ecological reference points (ERPs) approved by the Board in August, and reaffirms the Board's commitment to manage the fishery in a way that accounts for the species role as a forage fish.

"This TAC represents a measured and deliberate way for this Board to move into the realm of ecosystem-based management," said Board Chair Spud Woodward of Georgia. "The TAC strikes a balance between stakeholder interests to maintain harvest on menhaden at recent levels, while also allowing the ERP models to do what they are intended to do."

Based on projections, the TAC is estimated to have a 58.5% and 52.5% probability of exceeding the ERP fishing mortality (*F*) target in the first and second year, respectively. The TAC will be made available to the states based on the state-by-state allocation established by Amendment 3 (see accompanying table for 2021 and 2022 based on a TAC of 194,400 mt).

2021-2022 ATLANTIC MENHADEN QUOTAS

		Metric Tons	Pounds
TAC		194,400	428,578,637
1% Set Aside*		1,944	4,285,786
TAC After Set Aside		192,456	424,292,851
STATE	ALLOCATION	QUOTA (MT)	QUOTA (LBS)
ME	0.52%	995	2,194,080
NH	0.50%	962	2,121,582
MA	1.27%	2,453	5,407,708
RI	0.52%	996	2,196,488
CT	0.52%	993	2,188,342
NY	0.69%	1,330	2,931,091
NJ	10.87%	20,925	46,131,966
PA	0.50%	962	2,121,464
DE	0.51%	986	2,174,821
MD	1.89%	3,634	8,011,402
PRFC	1.07%	2,066	4,554,267
VA	78.66%	151,392	333,761,875
NC	0.96%	1,840	4,056,588
SC	0.50%	962	2,121,464
GA	0.50%	962	2,121,464
FL	0.52%	997	2,198,250
TOTAL	100%	192,456	424,292,851

*1% of the TAC is set aside for episodic events, the remaining TAC is allocated to the states per the provisions of Amendment 3. Quotas may be adjusted pending final 2020 landings and the redistribution of any relinquished quota.

ASMFC Atlantic Menhaden Allocation

51,000 metric tons is over
26% of the total allowable catch for
the entire Atlantic Coast

Atlantic Menhaden Allocation

The Center for Conservation Biology

William & Mary

20 August 2020

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The Honorable Ralph Northam
Governor, State of Virginia
PO Box 1475
Richmond, VA 23218

Dear Governor Northam,

The menhaden is a keystone fish within the Chesapeake Bay ecosystem. Many of our most iconic species including the bald eagle, osprey, great blue heron and brown pelican depend on menhaden stocks to sustain their breeding populations within the Bay. Other species such as common loons and northern gannets that stage within the Chesapeake also depend on menhaden to fuel their migrations. Approximately 30% of the North Atlantic gannet population comes into the Bay during the spring to feed on menhaden before flying north to breeding grounds in Newfoundland.

Deep withdraws of menhaden stocks for the reduction fishery is having an impact on consumer species. We have conducted fieldwork with osprey throughout the lower Chesapeake Bay for 50 years and data demonstrate ongoing impacts. Through three generations of graduate students (1975-2006) we have observed shifts in diet and an associated reduction in productivity. Fish delivery rates were more than three times higher in 1975 compared to 2006. Menhaden, once the dominant fish in the diet now represents less than 30%. Shifts in diet away from menhaden have been coincident with a 90% reduction in menhaden stocks (Maryland, DNR haul surveys). No other fish species available to consumers provides the energy content of menhaden.

Reductions in menhaden stocks have caused osprey productivity to decline to below DDT-era rates. These rates are insufficient to support the osprey population within the main stem of the Bay.

Menhaden provide critical ecosystem services within the Chesapeake Bay. We request that the needs of the broader ecosystem be considered when setting harvest policy and that menhaden stocks be maintained at levels that support a healthy Chesapeake Bay ecosystem.

Sincerely,

Bryan Watts

Bryan D. Watts, Ph.D.
Mitchell A. Byrd Professor of Conservation Biology
Director, Center for Conservation Biology
College of William and Mary

Atlantic Menhaden Allocation
William and Mary College

"Reductions in menhaden stocks have caused osprey productivity to decline to below DDT-era rates.

These rates are insufficient to support the osprey population within the main stem of the Bay."

Bryan D. Watts, Ph.D.

Reference: Letter to Governor Ralph Northam, 8/20/20

Conclusion

Support Senate Joint Resolution 6:

"General Assembly requests the Atlantic States Marine Fisheries Commission to consider **prohibiting the commercial reduction fishing of Atlantic menhaden**, including the use of purse seines and spotter planes, in the Chesapeake Bay"

Backup

Striped Bass Dependency on Atlantic Menhaden

Atlantic States Marine Fisheries Commission

NEWS RELEASE

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

FOR IMMEDIATE RELEASE
August 6, 2020

PRESS CONTACT: Tina Berger
703.842.0740

ASMFC Atlantic Menhaden Board Adopts Ecological Reference Points

Arlington, VA – The Atlantic Menhaden Management Board approved the use of ecological reference points (ERPs) in the management of Atlantic menhaden. By adopting ERPs, the Board will be accounting for the species' role as an important forage fish. The 2020 Atlantic menhaden benchmark assessments, which were endorsed by an independent panel of fisheries scientists, used the Northwest Atlantic Coastal Shelf Model of Intermediate Complexity for Ecosystems (NWACS-MICE) in combination with the single-species model (Beaufort Assessment Model or BAM) to develop Atlantic menhaden ERPs by evaluating trade-offs between menhaden harvest and predator biomass.

Striped Bass Dependency on Atlantic Menhaden

Atlantic striped bass was the focal species for the ERP definitions because it was the most sensitive predator fish species to Atlantic menhaden harvest in the model, so an ERP target and threshold that sustained striped bass would likely provide sufficient forage for other predators under current ecosystem conditions. For the development of the ERPS, all other focal species in the model (bluefish, weakfish, spiny dogfish, and Atlantic herring) were assumed to be fished at 2017 levels.

In addition to adopting ERPs, the Board discussed setting fishery specifications for 2021-2022. In 2017, the Board set the total allowable catch (TAC) at 216,000 metric tons for 2018-2019, and then maintained that TAC for 2020 with the expectation that it would be set in future years using ERPs. With the adoption of ERPs, the Board tasked the Atlantic Menhaden Technical Committee to run a projection analysis to provide a variety of TAC scenarios and their risk of exceeding the ERP *F* target to compare in setting specifications for 2021-2022. The Board will review the projection analysis at the Annual Meeting in October and then determine a TAC for 2021-2022. As stated in Amendment 3, if a TAC is not set at the Annual Meeting, the TAC from the previous year will be maintained.

For more information, please contact Kirby Rootes-Murdy, Fishery Management Plan Coordinator, at krootes-murdy@asmfc.org or 703.842.0740.

ASMFC Atlantic Menhaden Allocation

"Chesapeake Bay Reduction Fishery Cap - The annual total allowable harvest from the Chesapeake Bay by the reduction fishery is limited to no more than 51,000 mt. Harvest above the cap in any given year will be deducted from the next year's allowable harvest. Any amount of un-landed fish under the cap cannot be rolled over into the subsequent year. As a result, the cap in a given year cannot exceed 51,000 mt"

Reference: ASMFC Amendment 3 to the Interstate Fishery Management Plan for Atlantic Menhaden, November 2017, page v

Atlantic Menhaden Allocation
Salisbury University

The Maryland Legislative Sportsmen's Caucus

The Sportsmen's Best Friend in Annapolis

October 21, 2021

Steven G. Bowman
VMRC Chairman
Building 96, 380 Fenwick Road
Ft. Monroe, Virginia 23651

RE: "The Most Important Fish in the Sea" – IMMEDIATE ACTION

Mr. Bowman:

Each year the number of menhaden surviving the Virginia netting gauntlet to successfully reach Maryland's portion of the Chesapeake Bay is declining. This scientifically documented fact is detrimental to both avian and marine species dependent upon the "Most Important Fish in the Sea". This must change.

On October 15, 2021, a fishery biology professor from Salisbury University (Dr. Noah Bressman, PhD) formally addressed the dire menhaden issue in a statement to Maryland's DNR Secretary, et al. For the record, the Maryland's Legislative Sportsmen's Caucus within the Maryland General Assembly fully supports the position taken by Dr. Bressman and urges time-sensitive compliance by the Virginia Marine Resources Commission.

Here's what Dr. Bressman stated:

> "Currently, the Virginia-based menhaden fishery is overfishing the stock of Atlantic Menhaden in and around the Chesapeake Bay, which is preventing this important forage fish from making its way into the bay and its tributaries. As an important prey item for many important species in the bay, such as Striped Bass and Osprey, the disappearance of most of the menhaden from the bay is contributing to the disappearance of many species that rely on menhaden.

Virginia has been allotted about 75% of the entire Atlantic Coast's quota, which is a drastically disproportionate amount relative to its coastline. Additionally, much of their harvesting occurs as menhaden migrate into the bay, where they enter Maryland's waters. What this essentially means is 75% of the quota for the entire Atlantic Coast is being taken in the bay or just before they enter the bay. While this may not be causing overfishing for the entire Atlantic Coast based on quotas, because all of these fish are being taken from essentially just the bay, it is having locally drastic effects on the ecosystem.

Atlantic Menhaden Allocation
Salisbury University

"Currently, the Virginia based-menhaden fishery is overfishing the stock of Atlantic Menhaden in and around the Chesapeake Bay, which is preventing this important forage fish from making its way into the bay and its tributaries.

As an important prey item for many important species in the bay, such as Striped Bass and Osprey, the disappearance of most of the menhaden from the bay is contributing to the disappearance of many species that rely on menhaden."

Dr. Noah Bressman, Salisbury University,

Ref: Maryland Legislative Sportsmen's Caucus letter of October 21, 2021

Senate Joint Resolution 6: Atlantic States Marine Fisheries Commission – Atlantic Menhaden – Prohibition on Commercial Reduction Fishing – Testimony of Phil Zalesak, 3/1/22

Slide 1: Good morning, my name is Phil Zalesak and I am here today to support Senate Joint Resolution 6

Slide 2: I represent ten Maryland recreational fishing organizations throughout the State of Maryland

Slide 3:

- Atlantic menhaden are an important forage fish for striped bass.
- Overharvesting of Atlantic menhaden by industrial reduction fishing by Omega Protein is threatening the survival of striped bass and other predators in the Chesapeake Bay.
- Omega Protein is the last remaining industrial reduction fishery on the Atlantic Coast.
- The picture at the bottom is a striped bass swallowing a menhaden.

Slide 4: The recreational striped bass market represent over 800 million dollars in GDP to the State of Maryland and over 10,000 jobs

Slide 5: Science Summary

Slide 6: Chesapeake Bay contributes about 60% of the Atlantic stock of striped bass in the Atlantic Ocean. When this Bay fish is threatened, it impacts the entire Atlantic Coast.

Slide 7: Since 2010 the recreational harvest has dropped 68% (5.3 million to 1.7 million fish)

Slide 8: The Young of Year, fish less than a year old, are now at a 40 year low.

Slide 9: The Atlantic States Marine Fisheries Commission has determined that there are not enough Atlantic menhaden along the Atlantic Coast to adequately feed striped bass and other predators.

- They cut the total allowable catch by 10% from 216,000 metric tons to 194,400 metric tons.
- 78% was allocated to the State of Virginia based on history not science.
- 90% of the Virginia allocation was allotted to Omega Protein for a total of 136,252 metric tons.
- That represents over 70% of the total allowable catch for the entire Atlantic Coast
- Of that 136,000 metric tons, 51,000 metric tons was allocated to reduction harvesting in the Chesapeake Bay

Slide 10: 51,000 metric tons is over 26% of the total allowable catch for the entire Atlantic Coast.

Slide 11 & 12: Based on 50 of research at William and Mary, Dr. Bryon Watts has concluded that there are not enough Atlantic menhaden in the main stem of the Chesapeake Bay to support the osprey population.

Slide 13: Based on the economic importance of striped bass to Maryland's economy and the latest science, the recreational fishermen in the State of Maryland support Senate Joint Resolution 6.

Testimony of Thomas Lilly for Senate Panel March 1,2022

This is a brief summary of the "science" on this issue This Committee is not being asked to make a decision on what level of factory menhaden fishing is appropriate for Chesapeake Bay, That decision is the responsibility of the Commission. A proper airing of this issue at the Commision,in our opinion, is long overdue

In a letter to Governor Northam Professor Bryan Watts says ospreys are dying out on the Bay due to a chronic shortage of menhaden (report attached to Zalesack material) , Michael Academia, who speaks for Dr Watt's Center for Conservation Biology and whose PhD thesis is on the osprey-menhaden diet connection says ..."out of all the bird species, ospreys stand out alone and are inextricably linked to menhaden. Due to the dependency, ospreys represent one of the best and highly visible ecological reference points available to science." He says " depletion of menhaden has caused osprey production to decline to levels below the DDT era." Attached. The CBF Press Release July 2020 (Attached) confirms this ...it says " in the 1980s menhaden in the diet was 75% now it is 28% and that the nestlings mortality is as high as it was in the DDT era.

The Bay's large spawning rockfish that migrate into the Bay in early Spring that once supplied 70% of all the juveniles for the Atlantic Coast are chronically below target and 2021 marked the third consecutive year the stock failed in its purpose ..three years of the lowest Young of the Year production in 70 years. (see DNR survey in Phil Zalesak"s submission) The CBF Press Release says menhaden are the "most important fish in the Bay" and that " the rockfish population in the bay is showing signs of malnourishment and increasing mortality"...These large fish like the ospreys are uniquely dependent on menhaden to keep them healthy during the rigors of spawning. But the CBF release says menhaden in their diet has declined from 70% to 8%. Matt Cieri, a Maine scientist that headed the ASMFC environmental reference point project says menhaden fishing in the Bay must be reduced along with striped bass conservation to restore the species . Attached, Commercial and recreational striped bass fishing is a great tradition in Maryland that is dying out. Fishing isn't fun anymore. Alex's story. Compare this to New York where charter fishing, ospreys and eagles have bounced back when they banned factory fishing. See mail from editor NY Angler.

All menhaden exit the Chesapeake in cold weather and begin migrating back in to form the bay's forage base in early Spring with the spawning stock and all our other migrating species. These hundreds of surface schools are targeted by 8-10 300 foot long Omega purse seiners using spotter planes. These ships have the capacity to catch two to three times what is coming in....the Delegates are aware that requiring Omega fish in the Atlantic away from the bay entrance would prevent them from catching the schools migrating to Maryland when they fish in Virginia –quite possible as many as 2,000 of the 5,000 schools they catch there. This conflict and waste of Maryland's natural resources could be resolved by having Omega just fish in the US Atlantic where they already catch 2/3rds of their quota. No lost jobs of quota. One of the purposes of the Resolution is to have the Commission consider this problem that is unique to Maryland. All the other states can protect themselves from factory fishing and have done so....only Virgina allows it. Maryland outlawed it 70 years ago, but Maryland can't control what happens in Virginia unless the Maryland Delegates take action.

Dr. Noah Bressman, a Salisbury University biology professor summed this up saying protecting Chesapeake Bay"

"can be accomplished using qualitative management measures, such as seasonal and area closures without additional research. It can also be accomplished by moving the fishing into the U S federal zone as every state except Virginia has seen the necessity for doing. While I am always in support of more research for any topic (because I am a scientist) waiting for additional research on this issue that has always already clear will likely lead to menhaden continue to plummet in the Bay which will further reduce the capacity for striped bass to recover especially after the recent report showing their abysmal recruitment over the last three years period."

This is why the bay and the people of Maryland need this Resolution, without it the Commission will be locked in the same status quo of conveniently ignoring Chesapeake Bay and the impacts the intense factory fishing causes and they will just plow ahead when the bay could be restored by getting the menhaden to the fish and wildlife by just moving that foreign fishing company ..with its 300 foot by 50 foot ships out into the US Atlantic like every other state but Virginia has done See

Thank you Thomas Lilly

Pl

THE PROBLEM

Overharvesting of Atlantic menhaden in the Chesapeake Bay is not only **destroying striped bass, bluefish, and weakfish; it is also destroying ospreys.**

Michael Academia, a graduate assistant at William and Mary College, testified before the Atlantic Menhaden Management Board of the Atlantic States Marine Fisheries Commission on Wednesday afternoon, August 4th, and gave the following testimony:

"First of all, thank you members of the Board for listening.

Ospreys, also known as fish hawks, are one of our most iconic and cherished birds of prey; however, they c no longer sustain themselves within the main stem of Chesapeake Bay. Like the proverbial canary in the coal mine, ospreys are warning us of dangerous levels of overfishing.

I am a graduate student at William & Mary and represent the Center for Conservation Biology. My master thesis focu on the osprey-menhaden relationship.

Many birds such as pelicans, Bald eagles, herons, loons, and gannets depend on menhaden. But out of all the bird species, ospreys stand alone and are inextricably linked to menhaden. Due to this dependency, ospreys represent o of the best and highly visible ecological reference points available to science.

The Center for Conservation Biology has conducted fieldwork on osprey throughout the Chesapeake Bay for **50 yea and evidence** gathered demonstrates ongoing impacts. Through 4 generations of graduate students, the center ha documented shifts in osprey diet and reduction in productivity. For example, delivery rates of fish were 3x higher in 1 compared to 2006. Menhaden, once the dominant prey species in the diet, now represents less than 30%. Most importantly, **depletion of menhaden has caused osprey productivity to decline to levels below the DDT-era.**

No other fish species available provides the energy content of menhaden. They provide critical ecosystem services within Chesapeake Bay and beyond.

We request that the needs of the broader ecosystem be considered when setting harvest policy and menhaden populations be maintained at levels that support a healthy ecosystem in Chesapeake Bay. Thank you."

Menhaden by the Numbers

70% The amount of an adult rockfish's diet historically filled by menhaden.

8% The amount of an adult rockfish's diet currently filled by menhaden.

https://www.cbf.org/about-the-bay/more-than-just-the-bay/chesapeake-wildlife/menhaden/index.html

8% *The rockfish population in the Chesapeake Bay is showing signs of malnourishment and increasing mortality.*

75% The amount of an osprey nestling's diet filled by menhaden in the 1980s.

28% The amount of an osprey nestling's diet filled by menhaden today. *Though the number of nests throughout the Bay region has improved, nestling mortality is as high as it was in the DDT era.*

SIGN UP (HTTP://WWW US/STAY-UP-TO-DATE-ABOUT-THE-BAY.HTML)

From: Cieri, Matthew
Matthew.Cieri@maine.gov
Subject: Re: YOUR REMARK ??
Date: Aug 2, 2020 at 10:17:54 AM
To: Tom Lilly [illegible]

Hi Tom,

[illegible]

Any meaningful rebuilding of striped bass has include reductions in the striped bass fishing mortality from where it currently is. They can get part of the way there with reductions in menhaden fishing, but it won't be enough to rebuild the stock to target levels without reductions in striped bass fishing mortality.

Matt

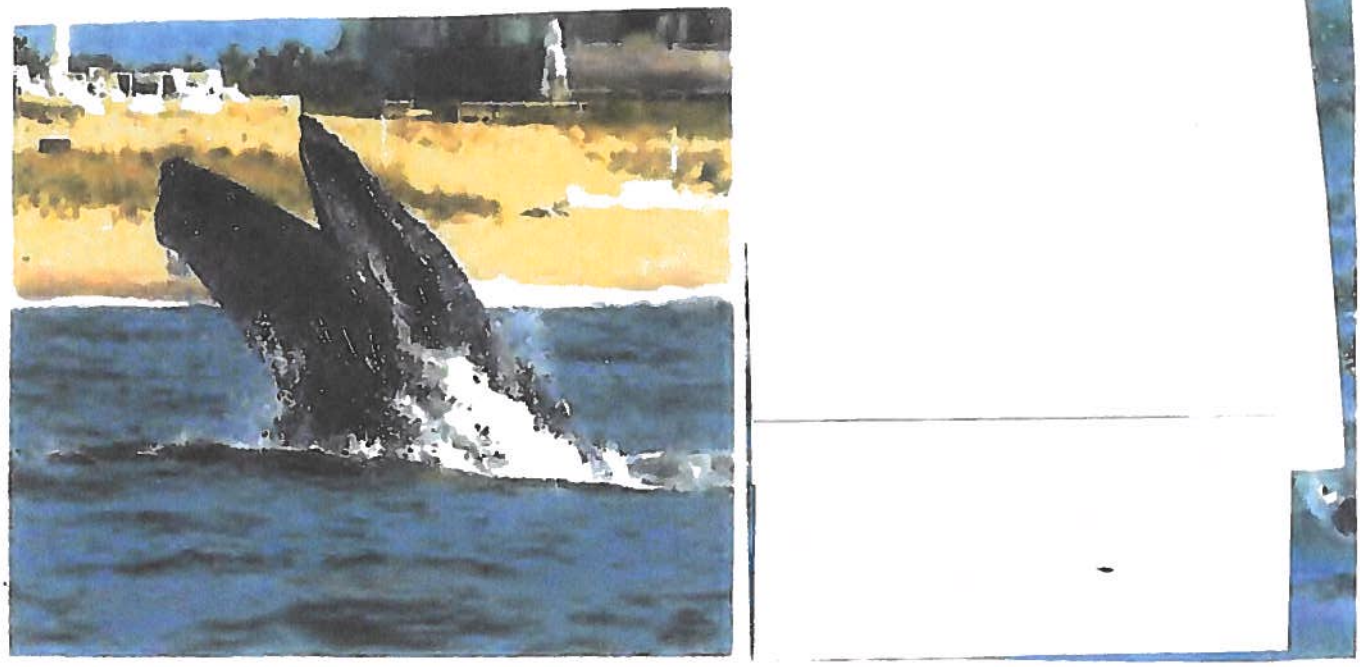
FWD: Menhaden
From: George Scocca george@nyangler.com
To: Tom foragematters@aol.com
Date: Mon, March 8, 2021 7:15am

Hello Tom:

I am the person that spearheaded the bill that has kept reduction fishing out of NY waters. The changes here have been unbelievable. I can talk about it all day. My single greatest accomplishment in 35 years of fisheries management.

The availability of bunker throughout our season has seen an increase in both charter and party boats carrying anglers to get in on our great striped bass fishery. Bass stick with their food source and this has kept a healthy population of stripers in our waters. It's sparked a number of for hire boats to carry more anglers than ever before.

It has also had a profound effect on our bird population. We now have about 12 dozen nest pair eagles on long island and the osprey population is thriving. All due to the amount of forage for them to eat.



And lets not forget the importance of their filtering our waters.
Thank you.
George R. Scocca
nyangler.com

Check out my Linkedin profile

Assistant Professor of Physiology
Salisbury University
Fish Biology, Biomechanics, Functional Morphology, and Behavior
Noahbressman.wixsite.com/noah
He/him/his

Begin forwarded message:

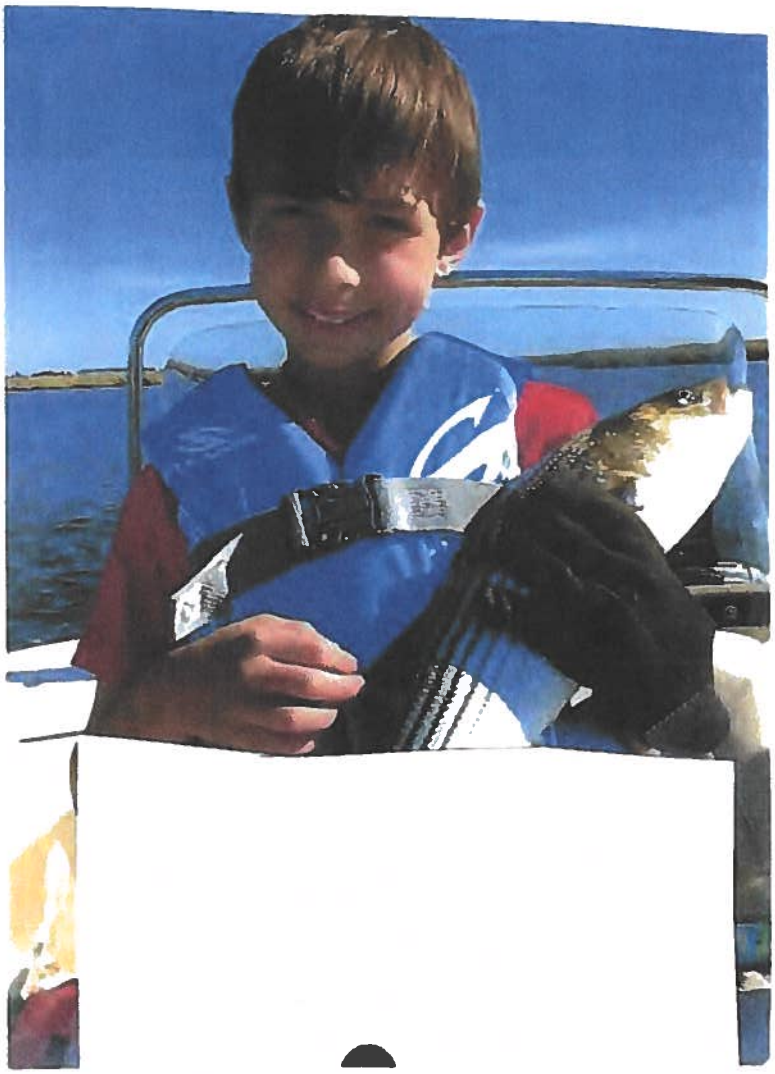
From: Noah Bressman
Date: October 18, 2021
To: Tina Berger <tberge
Subject: Re: FW: Fina

Thanks, Tina! I want to clarify that the most important thing I recommend is that the board take action now to evaluate the options to increase menhaden in Chesapeake Bay. If action was started at Tuesday's board meeting, some or all of the measures could be in effect for the 2022 season. This can be accomplished using qualitative management methods, such as seasonal and area closures without additional research. It can also be accomplished by moving the fishing into the US federal zone as every state except Virginia has seen the necessity for doing. While I am always in support of more research for any topic (because I am a scientist), waiting for additional research on this issue that is already clear will likely lead to menhaden continuing to plummet in the bay, which will further reduce the capacity for striped bass to recover in the bay, especially after the recent report showing their abysmal recruitment over the last 3 years. A delay in action, such as a several years-long stock and recruitment reassessment of the bay before action, will lead to the problem getting worse before it gets better.

Sincerely,
Dr. Noah Bressman, PhD

GRANDSON ALEX TAKEN ABOUT TEN YEARS AGO. MOST OF THE KIDS AND THEIR PARENTS HAVE LOST INTEREST .....FISHING JUST "ISN'T FUN ANYMORE"

Lets do the math. The bay's 400,000 fishing families aren't fishing much these days..the fishing has gotten worse and worse. Lets get the Chesapeake Bay the food their fish and wildlife need and deserve. Let's add more healthy fish to the equation. These families might get out on the bay a few more times a Summer and maybe have some great adventures. That could be another one million more precious days each year these parents and grandparents would have together enjoying the great sights and sounds Chesapeake bay has to offer. That is what is at stake here.



MULTIPLY THIS BY NINE OMEGA PURSE SIENERS WITH TWO FORTY FOOT SET BOATS EACH ,DIRECTED BY SPOTTER PLANES FISHING FIVE DAYS A WEEK FROM MAY TO DECEMBER VIRGINI

Virginia receives 78.6 of the entire Atlantic coast menhaden catch (TAC) For 2021-22 the TAC is 194,400 metric tons. VA quota 152,484 mt ,Omega quota 137,000 mt. of which 51,000mt can be caught in Chesapeake bay So, about 5,000 bay sized schools of 10 tons each with about 40-50,000 fish each are removed from the bay food chain every year. Virginia is the only state that allows factory fishing.

SHORERIVERS

Testimony in SUPPORT of SJ6 – Atlantic States Marine Fisheries Commission - Atlantic Menhaden - Prohibition on Commercial Reduction Fishing

March 1, 2022

Dear Chairman Pinsky and Members of the Committee,

Thank you for this opportunity to submit testimony in **SUPPORT of SJ6** on behalf of ShoreRivers. ShoreRivers is a river protection group on Maryland's Eastern Shore with 3,500 members. Our mission is to protect and restore our Eastern Shore waterways through science-based advocacy, restoration, and education.

This bill sets forth a resolution by the Maryland General Assembly asking the Atlantic States Marine Fisheries Commission to take further action to prohibit the commercial reduction fishing of Atlantic Menhaden, including the use of purse seines and spotter planes in the Chesapeake Bay in order to maintain a sustainable fishery. This reduction fishery poses a major threat to many Bay species every year, and when these other fisheries suffer it increases the pressure on other fisheries, including crabs and oysters. Thus, it is of critical importance to protect a foundational species like menhaden as much as possible.

Menhaden are incredibly valuable to the Chesapeake Bay and the many other commercial and recreational fisheries that occur in the rivers of the Eastern Shore. As a vital part of the ecosystem, menhaden filter plankton from the water and help to improve water quality, and they are a necessary food source for other aquatic species like striped bass and bluefish, but also for ospreys and bald eagles. The Department of Natural Resources noted in their 2021 Striped Bass survey that while the stiped bass young-of-year showed a slight increase in population from 2020, what was of note was the increased numbers of menhaden in the rivers, notable the Choptank River. When the menhaden population thrives, so do our other fisheries. And when our fisheries are healthy, we know that water quality and habitat are at healthy levels to support those populations, which means that our economies and local communities will see a benefit.

For these reasons stated above, ShoreRivers urges the Committee to adopt a **FAVORABLE** report on SJ6.

Sincerely,

Matt Pluta,
Choptank Riverkeeper, on behalf of:

ShoreRivers
Isabel Hardesty, Executive Director
Annie Richards, Chester Riverkeeper | Matt Pluta, Choptank Riverkeeper
Elle Bassett, Miles-Wye Riverkeeper | Zack Kelleher, Sassafras Riverkeeper

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shorerivers.org

MARYLAND
DEPARTMENT OF
NATURAL RESOURCES

Bill Number: Senate Joint Resolution 6

Short Title: Atlantic States Marine Fisheries Commission – Atlantic Menhaden – Prohibition on Commercial Reduction Fishing

Department's Position: Letter of Information

Explanation of Department's Position

The Maryland Department of Natural Resources (DNR) provides the following information on SJ 6.

This bill is a resolution to urge the Atlantic States Marine Fisheries Commission (ASMFC) to evaluate the population of Atlantic menhaden in the Chesapeake Bay and end the practice of purse seining for harvesting Atlantic menhaden in the Chesapeake Bay.

DNR agrees that menhaden, which are managed under the framework of the ASMFC, are an important species to the health of the Chesapeake Bay. As such, purse seining is already prohibited in Maryland waters.

Management of Atlantic menhaden in Virginia's portion of the Bay also occurs under the framework of the ASMFC. Primary responsibility for management was recently transitioned from Virginia's legislature to the Virginia Marine Resource Commission in 2020. Since this transition has taken place, Virginia has commenced a process of engaging a broad array of stakeholders in the scientific management of these fish.

According to ASMFC, the menhaden stock is currently healthy.

Maryland is a leader in working with ASMFC to develop conservative ecosystem reference points that were just adopted for the fishery summer 2020. This was both a major undertaking and accomplishment, and is key to ensuring a balanced approach to managing menhaden as both important for the commercial fishery and forage fish.

DNR believes that fishery management decisions should be rooted in science and within established frameworks and authorities like ASMFC. There is little precedent for ASMFC to direct a state on how to manage its quota (e.g., dictating particular gears, seasons, operating practices) so ASMFC is unlikely to support any action to prohibit a specific business from engaging in an established fishery. Initiating an action requiring specific management measures in other states through ASMFC may ultimately result in other states pursuing specific

Contact: Bunky Luffman, Director, Legislative and Constituent Services
Bunky.luffman1@maryland.gov ◆ 410-689-9165

management measures in Maryland that are counter to our state's management goals and objectives.

That said, if Virginia were to prohibit purse seining in their waters, it is likely that the unharvested Atlantic menhaden would contribute to larger stocks of menhaden, which would provide forage for species such as striped bass, bluefish, dolphins, and osprey. A larger forage base of menhaden could provide for a more diverse and abundant Bay ecosystem, which could lead to positive fiscal impacts although these connections have not yet been scientifically quantified.

For any additional information, please feel free to contact our Legislative and Constituent Services Director, Bunky Luffman.

From: Noah Bressman
To: Tina Berger
Cc: jack.bailey@senate.state.md.us; THOMAS LILLY; Phil Zalesak; davidsikorski@ccamd.org; amy.b.frieder@gmail.com
Subject: [External] Action on Atlantic Menhaden
Date: Friday, April 8, 2022 12:13:18 PM

Dear Tina,

I am Dr. Noah Bressman, a professor of fish biology at Salisbury University on the Eastern Shore of MD and I would like to submit a public comment to the ASMFC regarding the Atlantic Menhaden Management Board issues on the agenda. In the past, fisheries management groups decided upon a sustainable quota of 194,000 metric tons to harvest from the entire US Atlantic coast, from Maine down to Florida, assuming that harvest was spread relatively evenly along the coast. However, that is not what is currently happening.

Currently, there is only one processing plant for menhaden open in the US and that is in Virginia, which has essentially been allocated about 80% of that 1940,000 metric ton quota. Because this fishing fleet does not want to travel far to fish for menhaden, they stay locally in and around the mouth of the Chesapeake Bay. Menhaden are migratory fish that migrate north along the coast each spring into the Chesapeake bay to spawn (as well as other estuaries further north, but none are as large as the Chesapeake). Because all of these fish have to get funneled through a relatively narrow opening to get into the Bay, the menhaden fishery targets them at the mouth of the bay where they can catch lots and lots of fish very easily. This often means that these fish never get a chance to enter the bay into their spawning grounds, which means many will not have a chance to reproduce to continue their populations. This also means that almost 80% of the quota for the entire Atlantic coast is being caught in or around the Chesapeake Bay. While these numbers relative to the entire Atlantic Coast may be sustainable, the fact that almost all of the coast's quota is coming from the Bay means the menhaden population of the Bay is being devastated, which is devastating the Bay's ecosystem. These fish are the foundation of the Bay's ecosystem, which dolphins, osprey, bald eagles, whales, striped bass, red drum, and even blue crabs depend on for nutrients. Without all of this food in the Bay, populations are starving and declining of these other commercially and recreationally important species. We are already seeing big declines in the populations of striped bass, Maryland's state fish, with 3 of their worst reproductive years ever recorded being the last 3 years. Additionally, while electrofishing with the MD DNR for my lab's research sampling other fish in the tributaries of the Chesapeake Bay during the peak of striped bass spawning season a couple of weeks ago, I saw very few striped bass. While this was one day of sampling targeting blue catfish and snakeheads, this is the time of year where we should have seen hundreds if not thousands of spawning stripers in the tributaries. In total, I saw 7 individual striped bass while sampling several miles of the Nanticoke River and Marshyhope Creek, 4 of which were adults, all of which were relatively small - none of the Big Fat Fecund Female Fish that are important for sustaining populations. These fish are starving because of a lack of menhaden, which is part of the reason why their populations are down and why we saw so few on the day we sampled. This likely indicates another poor reproductive year to come, which will continue unless management action is taken on menhaden, among other factors.

I recommend that the menhaden harvest is delayed until a lot of menhaden have a chance to migrate into the bay to spawn, the harvest is pushed offshore to allow more menhaden to make it into the bay, the harvest is greatly reduced in the bay, and/or reapportioning the harvest

according the ASMFC Charter governing fisheries management that state the quotas need to be evenly spread along the coast as well as Amendment 3 that states social and economic factors need to be considered.

As an avid striper angler, having less striped bass means a direct impact on my social life and recreation, along with that of millions of other Bay residents and visitors (that bring money from out of state to the Bay), along with affecting the livelihood of many charter captains, headboat crews, and commercial watermen on the Bay. If action is not taken, millions of people in Maryland and many MD businesses will be suffering the effects of overharvesting of Menhaden to benefit 1 business in Virginia, which is not fair from a sociological standpoint, economic standpoint, and a legal standpoint based on ASMFC's own governing charter.

I hope you take these comments into consideration at the next ASFMC meeting regarding menhaden.

Please let me know you have received this public comment.

Thank You,
Dr. Noah Bressman, PhD
Assistant Professor of Physiology
Salisbury University
@NoahwithFish
noahbressman.wixsite.com/Noah
He/Him/His

Atlantic States Marine Fisheries Commission

DRAFT ADDENDUM I TO AMENDMENT 3 OF THE ATLANTIC MENHADEN INTERSTATE FISHERY MANAGEMENT PLAN FOR BOARD REVIEW

Commercial Allocations, Episodic Event Set Aside Program, and Incidental Catch/Small-Scale Fisheries

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

This draft document was developed for Board review and discussion at the May 2022 meeting week. This document is not intended to solicit public comment as part of the Commission/State formal public input process. However, comments on this draft document may be given at the appropriate time on the agenda during the scheduled meeting. Also, if approved, a public comment period will be established to solicit input on the issues contained in the document.

May 2022

Atlantic States Marine Fisheries Commission Seeks Your Input on Atlantic Menhaden Management

The public is encouraged to submit comments regarding this document during the public comment period. Comments will be accepted until 5:00 p.m. EST on **DAY, MONTH 2022**. Regardless of when they were sent, comments received after that time will not be included in the official record.

You may submit public comment in one or more of the following ways:

1. Attend public hearings pertinent to your state or jurisdiction; given COVID-19, it is likely most hearings will occur via webinar.
2. Refer comments to your state's members on the Atlantic Menhaden Board or Atlantic Menhaden Advisory Panel, if applicable.
3. Mail, fax, or email written comments to the following address:

James Boyle
Senior Fishery Management Plan Coordinator
Atlantic States Marine Fisheries Commission
1050 North Highland St., Suite 200 A-N
Arlington, VA 22201
Fax: (703) 842-0741
comments@asmfc.org (subject line: Atlantic Menhaden Draft Addendum I to Amendment 3)

If you have any questions please call James Boyle at 703.842.0740.

Commission's Process and Timeline

August 2021	Atlantic Menhaden Board Tasks Staff to Develop Draft Addendum I
August 2021 – April 2022	Staff Develops Draft Addendum I for Board Review
May 2022	**Atlantic Menhaden Board Reviews Draft Addendum I and Considers Its Approval for Public Comment**
May – July 2022	Board Solicits Public Comment and States Conduct Public Hearings
August 2022	Board Reviews Public Comment, Selects Management Options and Considers Final Approval of Addendum I
TBD	Provisions of Addendum I are Implemented

1. INTRODUCTION

The Atlantic States Marine Fisheries Commission (ASMFC) is responsible for managing Atlantic menhaden (*Brevoortia tyrannus*) in state waters (0–3 miles from shore) under the authority of the Atlantic Coastal Fisheries Cooperative Management Act, and has done so through an interstate fishery management plan (FMP) since 1981. The states of Maine through Florida have a declared interest in the fishery and are responsible for implementing management measures consistent with the interstate FMP. Management authority in the Exclusive Economic Zone (3-200 miles from shore) lies with NOAA Fisheries. For the purposes of this Addendum, the term "state" or "states" also includes the Potomac River Fisheries Commission.

At its August 2021 meeting, the ASMFC's Atlantic Menhaden Management Board (Board) approved the following motion:

Move to initiate an addendum to consider changes to commercial allocation, the episodic events set aside, and the small-scale/incidental catch provision. The purpose of this action is to address the issues outlined in the Atlantic Menhaden work group memo and the PDT should use the strategies provided in the work group memo as a starting point.

The Addendum proposes options to adjust states' commercial allocation to better align with availability; provide more flexibility for states declaring into the episodic event set aside (EESA) program; and reduce incidental catch and small-scale fisheries (IC/SSF) landings from recent levels.

2. OVERVIEW

2.1 Statement of the Problem

Since the implementation of Amendment 3 (2017), dynamics in the commercial menhaden fishery have changed, most notably the rise of landings in the Gulf of Maine and an increase in quota transfers to the New England region; an increase in landings under the IC/SSF provision; and an annual reliance by some states on the EESA program. To sufficiently address the issues posed by these changes, the addendum addresses three separate but related components of the management program: 1) commercial allocation, 2) the IC/SSF provision, and 3) EESA program.

2.1.1 Commercial Allocations

The current allocations have resulted in the Total Allowable Catch (TAC) not being fully used coastwide, while some states do not have enough quota to maintain current fisheries. Quota transfers alone are not enough to ameliorate this issue. Some states have become reliant on the EESA and IC/SSF provision to maintain their fishery while other states regularly do not land their allocation.

2.1.2 Episodic Event Set Aside (EESA) Program

Over 90% of the EESA has been used in all years since 2016. With the increase in Atlantic menhaden availability to the Northeast, the program has become a secondary regional quota for several states to continue fishery operations in state waters. The dependency on the EESA highlights the mismatch of Atlantic menhaden distribution and availability to current commercial allocations.

2.1.3 Incidental Catch and Small-Scale Fisheries (IC/SSF)

The IC/SSF provision was intended to provide continued access for low-volume landings of menhaden once a state's directed fisheries quota was met and reduce regulatory discards. In recent years, menhaden availability at the northern part of its range has resulted in directed fishery quotas being met earlier in the year. Additionally, the coastwide landings under this category have exceeded a number of states directed fishery quotas and ranged from 1-4% of the annual TAC. Landings under this provision have never caused the overall TAC to be exceeded but without changes, landings could remain at high levels or increase, leading to a potential exceedance of the TAC. Finally, the language in Amendment 3 has led to different interpretations of when landings fall under this provision (*i.e.* once a state's sector allocation is met or only once the full state allocation is met) and should be clarified.

2.2 Background

2.2.1 Allocation

Under Amendment 3, each state is allocated a 0.5% minimum quota and the remainder of the TAC is allocated based on a three-year average of landings from 2009-2011. On an annual basis, states have the option to relinquish part of or all of their fixed minimum quota by December 1st of the preceding fishing year. Any quota relinquished by a state is redistributed to other states that have not relinquished their quota, based on landings data from 2009-2011. Any overage of quota allocation is determined based on final allocations (inclusive of transfers), and the overage amount is subtracted from that state's quota allocation in the subsequent year on a pound-for-pound basis.

Amendment 2 (2012) also based state allocations on the three-year average of landings from 2009-2011; however, there was no fixed minimum. Table 1 shows a comparison of state quotas under Amendments 2 and 3, and highlights the influence of the 0.5% fixed minimum on states' allocations.

Table 1. A comparison of state allocations under menhaden Amendment 2 and Amendment 3. Both Amendments used a 2009-2011 allocation timeframe; Amendment 3 included a 0.5% fixed minimum. While under Amendment 2, Pennsylvania was not a part of the Board and did not have an allocation, therefore is noted with a "-".

State	Amendment 2 Allocation (%)	Amendment 3 Allocation (%)
Maine	0.04%	0.52%
New Hampshire	0%	0.50%
Massachusetts	0.84%	1.27%
Rhode Island	0.02%	0.52%
Connecticut	0.02%	0.52%
New York	0.06%	0.69%
New Jersey	11.19%	10.87%
Pennsylvania	-	0.50%
Delaware	0.01%	0.51%
Maryland	1.37%	1.89%
PRFC	0.62%	1.07%
Virginia	85.32%	78.66%
North Carolina	0.49%	0.96%
South Carolina	0%	0.50%
Georgia	0%	0.50%
Florida	0.02%	0.52%

From 2018 to 2020, total landings (directed, IC/SSF, and EESA) have increased among the New England states of Maine, New Hampshire, and Massachusetts (Table 2). From 2016-2020 Maine and Massachusetts have increased their percentage of coastwide total landings every year. A number of states have maintained directed fisheries while their landings have represented less than 0.1% of coastwide total landings (Rhode Island, Connecticut, and Delaware). In 2020, Maine, Massachusetts, New York, and New Jersey increased their percentage of coastwide total landings, relative to the previous year. Virginia's percentage of the coastwide landings decreased greatly in 2020 relative to 2019 because the state's largest fishery and processing plant was shut down for several weeks due to the COVID-19 pandemic.

Table 2. State total landings as a percentage of coastwide (CW) landings, 2016-2020. Total landings include directed bait, reduction, IC/SSF, and EESA landings. Amendment 3 allocations for directed bait and reduction landings were implemented beginning in 2018. To protect confidentiality, information for New Hampshire, Pennsylvania, South Carolina, and Georgia have been removed. **These are proportions of the coastwide landings; they do not represent allocations.**

State	% of 2016 CW Landings	% of 2017 CW Landings	% of 2018 CW Landings	% of 2019 CW Landings	% of 2020 CW Landings
Maine	1.50%	2.31%	3.48%	4.91%	6.33%
New Hampshire				0.99%	1.02%
Massachusetts	0.76%	0.96%	1.37%	1.51%	2.17%
Rhode Island	0.00%	0.45%	0.17%	0.01%	0.05%
Connecticut	0.02%	0.05%	0.20%	0.03%	0.03%
New York	0.37%	0.40%	0.11%	0.21%	1.09%
New Jersey	11.47%	12.15%	11.97%	10.96%	12.22%
Pennsylvania					
Delaware	0.02%	0.02%	0.04%	0.02%	0.04%
Maryland	1.40%	0.76%	0.74%	0.73%	0.64%
PRFC	0.63%	0.55%	0.79%	0.51%	0.54%
Virginia	83.66%	82.08%	80.85%	79.93%	75.66%
North Carolina	0.10%	0.20%	0.17%	0.12%	0.15%
South Carolina					
Georgia					
Florida	0.07%	0.07%	0.06%	0.05%	0.06%
Total	100.00%	100.00%	100.00%	100.00%	100.00%

Since implementation of Amendment 3, the number of quota transfers has increased over time with 7, 17, and 15 quota transfers occurring in 2018, 2019, and 2020, respectively. Over this timeframe, all but three states were involved in either giving or receiving quota. However, not every state transferred quota consistently; only Maine, Connecticut, New York, Maryland, and Florida either gave or received quota every year from 2018-2020. Maine, New Hampshire, and Massachusetts had a net increase in quota through transfers in all three years. The net increase in quota over the three years ranged from 1.3 to 6.57 million pounds (Table 3). While the transfer of quota away from a state does not necessarily represent a decrease in abundance of menhaden, the transfer of quota to the New England states has coincided with increasing availability of menhaden regionally and the need for bait fish as the availability of Atlantic herring has decreased.

Table 3. Quota transfers in pounds by state for 2013-2020.

State	2013	2014	2015	2016	2017	2018	2019	2020	2018-2020 Net Total	2018-2020 Average
ME				+1,800,000	+195,180	+5,400,000	+6,573,592	+5,450,000	+1,742,3592	+5,807,864
NH							+3,373,592	+2,300,000	+5,673,592	+1,891,197
MA	-500,000	-260,000	-508,685	-35,986			+1,300,000	+2,350,000	+3,650,000	+1,216,667
RI	+15,000	+50,000	+33,685	+35,986			-400,000	-1,800,000	-2,200,000	-733,333
CT						-500,000	-2,400,000	-2,000,000	-4,900,000	-1,633,333
NY	+1,000,000	+210,000	+475,000	+492,823	+300,000	-1,000,000	-1,900,000	+500,000	-2,400,000	-800,000
NJ										
PA								-500,000	-500,000	-166,667
DE						-150,000		-100,000	-250,000	-83,333
MD						-1,500,000	-1,000,000	-1,350,000	-3,850,000	-1,283,333
PRFC										
VA				-1,500,000		-1,000,000	-1,000,000		-2,000,000	-666,667
NC	-575,000			-877,823	-495,180		-600,000	-1,800,000	-2,400,000	-800,000
SC							-2,347,184	-1,650,000	-3,997,184	-1,332,395
GA										
FL	+60,000			+85,000		-1,250,000	-1,600,000	-1,400,000	-4,250,000	-1,416,667

2.2.2 Episodic Event Set Aside Program (EESA)

The EESA Program was first implemented under Amendment 2 and clarified under Technical Addendum I later that year. Amendment 3 made no additional changes to the program. Annually, 1% of the TAC is set aside for episodic events, which are defined as any instance in which a qualified state has reached its quota allocation prior to September 1st and the state can prove the presence of unusually large amounts of menhaden in its state waters. To demonstrate a large amount of menhaden in state waters, a state can use surveys (e.g., aerial, seine) to indicate high biomass; landings information; or information highlighting the potential for fish kills, associated human health concerns, and that harvest would reduce or eliminate the fish kill. The goal of the program is to add flexibility in managing menhaden by allowing harvest during an episodic event, reduce discards, and prevent fish kills. States eligible to participate in the EESA program are limited to Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, and New York. When a state declares into the EESA, they are required to implement daily trip level harvester reporting and submit weekly reports to the ASMFC; restrict harvest and landings to state waters; and implement a maximum daily trip limit no greater than 120,000 pounds per vessel.

From 2013 through July 2021, the EESA has been used by Maine (6 years), Rhode Island (5 years), Massachusetts (2 years), and New York (2 years). Up to three states have participated at the same time. The starting date of states declaring into the program has ranged from mid-May to mid-August, with New York and Rhode Island opting in earlier than Maine and Massachusetts. Over 90% of the set-aside has been used in all years since 2016. In 2018 and 2019, Maine was the only state to declare into the EESA program and landed approximately 4.6 and 4.4 million pounds, respectively. In 2020, Maine and Massachusetts declared into the EESA program and combined the two states landed approximately 4.5 million pounds. Multiple states

have implemented harvest control measures beyond the FMP's 120,000-pound trip limit, including: lower daily landings limits, weekly limits, limited landing days, and biomass thresholds for when the commercial fishery can operate.

The increasing reliance on the EESA program by some states has coincided with the decline in Atlantic herring and the increased availability of Atlantic menhaden in the Gulf of Maine. For more than a hundred years, there is evidence that periodic abundance of menhaden in the Gulf of Maine may last from 1 to 20 years then disappear for 1 to 20 years (Figure 1). In order to use the EESA and minimize disruptions to fishing activities, some states have sought creative ways at keeping their directed fishery open. In 2021, a number of states requested quota transfers as a group while fishing in the EESA, allowing for multiple quota transfers to be processed while the states continued to participate in the EESA program, in an effort to enable their directed fishery to resume after exiting the EESA with minimal interruption.

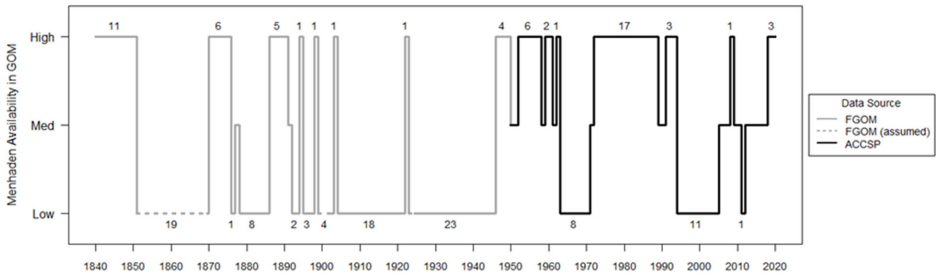

Figure 1. Reconstructed history of availability of Atlantic menhaden to the Gulf of Maine. The number of consecutive years in either a "High" or "Low" availability state are labeled. Data sources: *Fishes of the Gulf of Maine* (Bigelow and Schroeder 2002) and the Atlantic Coastal Cooperative Statistics Program (ACCSP).

2.2.3 Incidental Catch and Small-Scale Fisheries (IC/SSF)

A bycatch allowance was first implemented under Amendment 2, modified under Addendum I to Amendment 2 (2016), and modified again under Amendment 3. As outlined in Amendment 3, under the IC/SSF provision, after a state's allocation is met, small-scale directed and non-directed gear types may continue to land up to 6,000 pounds of menhaden per trip per day. The following gear types are identified in Amendment 3 as eligible to participate:

Small-scale gears: cast nets, traps (excluding floating fish traps), pots, haul seines, fyke nets, hook and line, bag nets, hoop nets, hand lines, trammel nets, bait nets, and purse seines which are smaller than 150 fathoms long and 8 fathoms deep.

Non-directed gears: pound nets, anchored/stake gillnets, drift gill net, trawls, fishing weirs, fyke nets, and floating fish traps.

Since Amendment 2, not all states transition from a directed fishery to an incidental catch or small-scale fishery under the same conditions. Both New Jersey and Virginia subdivide their quotas among sectors and have done so since state quotas were implemented in 2013. Virginia allocates its annual quota to three sectors: the reduction sector, the purse seine bait sector, and the non-purse seine bait sector. New Jersey allocates the majority of its annual quota to the purse-seine fishery, and the remaining quota is allocated to all other gear types. Once the non-purse seine bait sector or "other gears" fishery has harvested its portion of the state's allocation, that fishery moves into an IC/SSF regardless of whether the entire state's quota has been harvested. This has resulted in Virginia and New Jersey reporting IC/SSF landings when they have not harvested their overall quota allocation for a given year. Since the inception of the IC/SSF provision, both states have reported landings following the closure of Virginia's non-purse seine bait fishery and New Jersey's "other gears" fishery as IC/SSF.

Prior to 2016, several states' IC/SSF landings are considered confidential, therefore only information from 2016-2020 is included in Table 4. From 2016-2020, 11 different states have had IC/SSF landings, with the most number of states (8) reporting IC/SSF in a year occurring in 2016 and the fewest (1) occurring in 2019. The annual coastwide total IC/SSF landings ranged from approximately 2.1 million pounds to 13.9 million pounds. The highest amount occurred in 2020, when Maine landed the majority at 13.6 million pounds, representing 53% of Maine's total landings that year. From 2016-2017 and 2018-2019, landings in this category increased by over 200%, with Maine being the only state with IC/SSF landings in 2019. From 2018-2020, the TAC remained constant at 216,000 mt while IC/SSF landings as a percentage of the annual TAC rose from less than 1% (2018) to nearly 3% (2020).

Table 4. IC/SSF landings in pounds from 2017-2020. Only states with these landings in this time period are included in the table. Source: state compliance reports

State	2016	2017	2018	2019	2020
Maine		5,373,940	2,995,145	10,750,929	13,605,497
Massachusetts		0	0	0	49,350
Rhode Island	39,540	135,748	0	0	0
Connecticut		126,986	0	0	0
New York	281,017	807,392	0	0	282,169
New Jersey	195,523	0	204,240	0	20,190
Delaware	20,823	29,285	0	0	0
Maryland	995,698				
PRFC	105,669	670,447	0	0	0
Virginia	325,692	0	110,281	0	0
Florida	111,165	263,643	0	0	0
Total	2,075,127	7,407,441	3,309,666	10,750,929	13,957,206
Percent Change		257%	-55%	225%	30%

Since 2013, a majority of landings under this provision occur on trips that land either 1,000 pounds or less (56%), or greater than 5,000 pounds but less than 6,000 pounds (19%). However, landings per trip has increased in recent years (in 2020, 24% of trips < 1,000 pounds; 49% of trips >5,000 pounds; Figure 2). From 2017 to 2020, the majority of these landings have been caught by purse seine (80%, average for the time series), followed by fixed gill nets (12%, average for the time series). The share of IC/SSF landings using purse seine gear has increased from 57% in 2017 to approximately 88% in 2019 and 2020 (Table 5).

Figure 2. Percent of incidental trips by size in pounds, 2013-2020. Source: state compliance reports

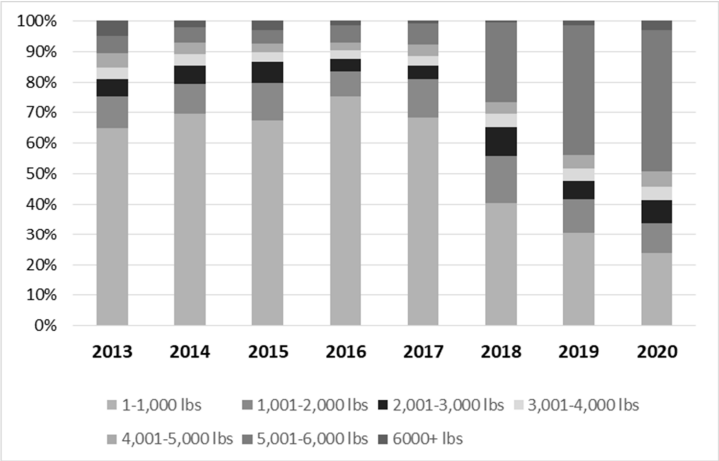

Table 5. Annual summary of total IC/SSF landings in pounds as a fraction of coastwide TAC; and the fraction of total IC/SSF landings coming from small-scale directed purse seine fishing. Source: state compliance reports

Year	Total landings	% of TAC	Landings from purse seine	% from purse seine
2013	4,376,741	1.2%	0	0%
2014	6,831,462	1.9%	0	0%
2015	5,991,612	1.5%	0	0%
2016	2,075,127	0.5%	0	0%
2017	7,407,441	1.8%	4,291,347	58%
2018	3,290,066	0.7%	2,419,194	74%
2019	10,750,929	2.4%	9,545,747	89%
2020	13,957,206	3.1%	12,332,677	88%

2.3.0 Social and Economic Impacts

Atlantic menhaden provide social and economic value to a diverse group of stakeholders both directly, to commercial and recreational menhaden fishing communities, and indirectly, to

those who derive value from finfish, coastal birds, or marine mammals that predate upon menhaden. Menhaden-specific ERPs were developed and implemented to account for these diverse needs. The ERPs aim to provide sufficient menhaden to support sustainable menhaden fisheries, as well as menhaden's important role as a forage fish. Ensuring a stable forage base could increase the abundance of species that predate upon menhaden, such as other finfish, coastal birds, or marine mammals. An increase in abundance of these species could, in turn, lead to positive social and economic impacts for individuals, groups, or communities which rely on these resources for consumptive (e.g., commercial or recreational harvest) or non-consumptive purposes (e.g., bird or whale watching). Individuals who hold non-use values associated with affected species may also benefit from increased abundances (e.g., existence value from knowing a particular environmental resource exists or bequest value from preserving a natural resource or cultural heritage for future generations). Estimating potential economic or social impacts to these stakeholders as a result of menhaden-specific ERPs is challenging given complex and dynamic ecological relationships as well as the lack of socioeconomic data, especially for nonmarket goods and services.

This Addendum includes several measures which could carry social and economic impacts, notably potential changes to commercial allocations, the episodic event set aside program, and the incidental catch/small-scale fisheries provisions. The impacts of these changes on an individual stakeholder group will depend not only on the direction of these changes (e.g., whether the allocation is increasing or decreasing), but also a number of other social and economic factors. The extent and distribution of positive or negative socioeconomic effects arising from changes to allocations, or other provisions, is dependent on price elasticities (responsiveness of demand to a change in price), substitute products, fishing costs, alternative employment opportunities, fishing community structure, and possibly other factors.

Identifying quota allocation methods which are fair and equitable among fishery sectors, gear types, and regions will enhance socioeconomic net benefits if changes in allocation result in higher value or more efficient use of the menhaden resource. Efficiency improving shifts in allocation, while potentially beneficial overall, could disadvantage individual stakeholders through reductions in harvests, revenues, and profits.

A 2017 socioeconomic study of the commercial bait and reduction fisheries, funded by the ASMFC, contains several findings which elucidate possible social and economic impacts resulting from changes in menhaden management. While this study was conducted to inform Amendment 3, its findings may still be informative to the measures included in this Addendum. However, it is important to note that the study was focused on potential changes to the coastwide TAC, not the measures being considered in this Addendum. A study focused on, for example, allocation changes might have different results based on the different spatial scales and tradeoffs considered.

In the 2017 study, researchers interviewed and surveyed industry members to uncover salient themes, analyzed historic landings data to resolve market relationships, performed economic impact analyses to consider the effects of various TAC changes, and conducted a public opinion

survey to assess attitudes toward menhaden management (see Whitehead and Harrison, 2017 for the full report). Interviews and surveys of commercial fishers and other industry members found mixed opinions on several subjects; however, many agreed that the demand for menhaden bait, oil, and meal had increased in recent years. Exogenous demand increases, if leading to increases in ex-vessel prices, could benefit menhaden bait and reduction industry members.

Analysis of historic landings data revealed that prices for menhaden were negatively related to landings levels, but that this relationship was small and insignificant in some instances. In particular, state-level analysis showed ex-vessel price was insensitive to landings. This finding suggested that reductions in the TAC might reduce commercial fishery revenues as decreases in landings are not fully compensated by higher prices. The effects of a change in the allocation of TAC among states is not clear. However, it was found that ex-vessel prices of menhaden were not uniform along the coast, with some states having higher prices than others, suggesting a change in allocation could influence fleet revenues.

Economic impact analyses of changes to the TAC found income and employment decreases (increases) corresponding to TAC decreases (increases), with the largest impacts concentrated in New Jersey and Virginia. For example, the analysis suggests that when totaling direct, indirect, and induced economic changes in the bait fishery, a 5% increase in the TAC from the 2017 baseline would result in 18 more jobs, a $476,000 increase in total earnings, and a $1.7 million increase in total economic output. Looking at the reduction sector, a 5% increase in the TAC from the 2017 baseline is estimated to increase total economic output (includes direct, indirect, and induced economic effects) by $3.6 million in Northumberland county and add 77 full and part-time jobs The difference in economic impacts between the bait and reduction sector is largely due to the difference in scale between the sectors, i.e., a 5% increase to reduction landings would be much higher in metric tons than a 5% increase to bait landings. In addition, it is important to note that economic impact analyses such as the one conducted in this study are a coarse assessment of potential economic impact, and they often do not take into account specific fishery and market dynamics.

Interestingly, subsequent analysis of coastal county income and employment changes in response to changes in bait landings (not reduction landings) showed little effect, casting some doubt on the conclusion that adjustments in menhaden TAC consistently lead to changes in fishery income and employment in the bait fishery. It may also be that the magnitude of impact is dependent on the size of the fishery in each state and the ability of fishermen to harvest other species. Nonetheless, it is reasonable to expect that if the TAC were to remain fixed but be allocated to states differently, those states receiving increased allocation would have positive economic impacts if the increase in allocation would lead to an increase in harvest. For those that received decreased quota, the expected impacts would depend on the expected impacts on harvest: if the reduced allocation would reduce harvest, negative economic impacts would be expected; however, if the reduced allocation was less than or equal to the state's latent quota, i.e., would not have any expected impacts on harvest, no economic impacts would be expected.

3. PROPOSED MANAGEMENT PROGRAM

This addendum considers modifying the following components of the management program: 1) commercial allocations, 2) IC/SSF provision, and the 3) EESA program. An objective is listed for each component to guide evaluation of proposed options for addressing the issues identified in the statement of the problem. The Plan Development Team (PDT) has highlighted the management options that they recommend the Board remove in order to focus on key solutions and reduce the complexity of the document. Taking these steps will ensure the public will be able to understand and comment on proposed changes to the management program more effectively. Recommendations can be found in an accompanying memo (M22-48). As the document is drafted there are 48 total options in the Draft Addendum (27 combinations of allocation options; 5 options for the EESA program; and 16 options for the IC/SSF provision).

3.1 Commercial Allocation

Objective: Allocations should be adjusted to 1) align with the availability of the resource 2) enable state to maintain current directed fisheries with minimal interruptions during the season; 3) reduce the need for quota transfers and; 4) fully use the annual TAC without overage.

To account for the various combinations of allocation methods and timeframes the following management options have been divided into two steps. The first step outlines the method for setting the minimum allocation, and the second step outlines the approach used to allocate the remaining TAC. An option must be chosen in each step to complete an allocation package. Options under each of the following steps were developed using total landings information including quota transfers, landings under the IC/SSF and EESA program.

Step 1:

3.1.1 Allocation options for addressing the minimum allocation.

The current fixed minimum allocation of 0.5% has been consistently underutilized by several states, with some states transferring or relinquishing some or all of their quota, and others keeping their unused quota. The Amendment 3 provisions of EESA, IC/SSF, and quota transfers have been utilized every year since the Amendment was implemented, indicating the latent quota created by the fixed minimum could be adjusted to reduce reliance on these provisions. Some states have highly variable landings, which will likely lead to them rarely exceeding their allocation under some allocation option below. It is important to keep in mind nearly all states have the potential to reach their quota prior to the end of the year under any allocation strategy under the current TAC. Any latent quota reduction produced by selecting one of the tiered options below will automatically be reallocated to the states based on the allocation method selected in step 2 (section 3.1.2).

Option A. Status Quo: Each state is allocated a 0.5% fixed minimum quota. Total TAC assigned under this option is 8.0% (i.e. 16 states x 0.50%= 8%).

Option B. Two-tiered fixed minimum approach: This option would assign states into one of two tiers (0.01% or 0.50%) based on total landings. This approach would reduce latent quota, but not reduce the percent allocation to states currently using their fixed minimum quota. The states of Pennsylvania, Delaware, South Carolina, Georgia, and Florida would be included in tier one and receive 0.01%, and the remaining states would be in tier two and receive 0.5% of the TAC. The five states in tier one have consistent small scale, bycatch fisheries, or have harvested no menhaden from 2009-2020. The 0.01% allocation coupled with the timeframe allocation assigned in Step 2 below would have covered their limited landings from 2009-2020 under most combinations. The few instances of overages would have been minor, and could have been accounted for in the current IC/SSF provision, with little increase to total landings under that provision. Total TAC assigned under this option is 5.55% (i.e., 5 states x 0.01% + 11 states x 0.50% = 5.55%).

Option C. Three-tiered fixed minimum approach: This option would assign states into three tiers (0.01%, 0.25%, or 0.50%) based on total landings. This approach further reduces latent quota compared to Option B. The states of Pennsylvania, South Carolina, and Georgia would be included in tier one and receive 0.01%. Tier two includes Connecticut, Delaware, North Carolina, and Florida, with each state receiving 0.25%. The remaining states would be in tier three and receive 0.5% of the TAC. The three states in tier one have consistent small-scale, bycatch fisheries, or have harvested no Atlantic menhaden from 2009-2020. The 0.01% coupled with the timeframe allocation assigned in Step 2 below would have covered their limited landings from 2009-2020 under all combinations. Depending on the selection made in Step 2 below, the tier two states would have had sufficient quota to cover their landings every year from 2009-2020, except North Carolina, which could have had up to two years that would have not been covered depending on the timeframe selected, but in nearly all other years they would have used less than half of their allocation. Total TAC assigned under this option is 5.53% (i.e., 3 states x 0.01% + 4 states * 0.25% + 9 states * 0.50% = 5.53%).

Commented [TK1]: The PDT is recommending this option be set back to its original draft, if not then remove either option B or C from the document. Previously DE and FL were in tier 1 and NY was in tier two, the old three tier option removed the most latent quota. As drafted there is only a 0.02% difference in allocation of option B and C, hence the PDT recommend removal of one of the two.

Step 2:

3.1.2 Timeframes to base allocating the remaining TAC.

Option 1. Status Quo: Three-year average of landings from 2009-2011. This option only incorporates landings from a short unregulated time period and does not reflect current Atlantic menhaden distribution or fishery performance.

Option 2. 2018-2020
The quota allocation timeframe is based on the most recent average landings from 2018 to 2020. This timeframe reflects the most recent landings history and is more likely to align with current stock distribution, but does not reflect previous stock distribution or fishery performance.

Option 3. Weighted Time Frames
These options consider both recent and historical timeframes with sub-options of different weighting values. These options are similar to a long term average but focus on a shorter overall timeframe, and can emphasize either more recent or historical fishery performance.

- 3A. Weighted Allocation Timeframe #1 (2009-2011 and 2018-2020) includes the three most recent years and the first three years of quality bait fishery data during the unregulated time period.
  - Sub-Option 1. 25% 2009-2011 / 75% 2018-2020 – This weighting strategy emphasizes the more recent timeframe.
  - Sub-Option 2. 50% 2009-2011 / 50% 2018-2020 – This strategy weights both timeframes evenly.
- 3B. Weighted Allocation Timeframe #2* (2009-2012 and 2017-2020) includes the four most recent years and the first four years of quality bait fishery data during the unregulated time period.
  - Sub-Option 1. 25% 2009-2012 / 75% 2017-2020– This weighting strategy emphasizes the more recent timeframe.
  - Sub-Option 2. 50% 2009-2012 / 50% 2017-2020 – This strategy weights both timeframes evenly.

Commented [TK2]: The PDT recommends removal because this option achieves the same objective as timeframe 1 of option 3A.

Option 4. Moving Average
This option uses a three-year moving average to annually adjust allocations as the stock and fishery dynamics change. The three-year average is lagged to allow for finalizing data and time to inform states of their quota (i.e. 2019-2021 average used to set 2023 allocation). This option continually adjusts allocations to recent stock distribution and fishery performance, potentially reducing the need for reallocating in the future. Landings used to calculate the three year moving average differ under each of the options and may include a state's base quota, any quota transferred to a state, catch under the EESA and catch under the incidental catch set aside. Any state with harvest overage within the three year time frame that is not covered by the provisions of the FMP will not have the overage portion of their landings count in calculating the moving average, and will still be required to pay any overage back pound for pound the year following the overage occurrence.

- 4A. No alterations to the Option. The Board will select options in the remaining sections of the document that have the potential to limit or increase a state's ability to increase landings annually.

Commented [TK3]: The PDT sees the three year timeframe of the average as sufficient in eliminating the outsized influence of a single year and preventing a race to fish.

4B. Provisions to limit rapid shifts in a states moving average.
State landings less than or equal to the coastwide TAC would be used in the calculation of the moving average, regardless of the source. If total landings (directed plus IC/SSF plus EESA) are below the TAC, then all landings would be included. If directed landings are below the TAC but IC/SSF and/or EESA landings bring total landings over the TAC, then only the portion of IC/SSF and EESA landings that achieve the TAC would count. For example, if directed landings are 2M lbs below the TAC, but IC/SSF and EESA landings are 5M lbs, then only 2M lbs of those would be used in the moving average calculation. If multiple states contribute to the IC/SSF and/or EESA landings, then the allowable portion of those landings to be used in the calculation (2M lbs in the example above) would be divvied up among those states proportional to each's states contribution of the total IC/SSF and/or EESA landings.

4C. Limiting landings used in calculating the moving average. This option removes landings under the EESA and IC/SSF from the calculation of the three year moving average. Only directed landings caught under a state's annual allocation or through an official transfer from another state will be included. While this option would ensure the EESA and IC/SSF are not used to rapidly increase a state's percentage, it also severely hinders the moving averages ability to shift landings, increases reliance on state to state transfers to make the moving strategy work, and will not greatly reduce the reliance on the EESA and IC/SSF.

Commented [TK4]: The PDT recommends removal of this option. This option limits the average to landings acquired under a state's annual allocation or quota transfer. Using such a limited data would not allow for movement of quota in a meaningful way and would not meet the goal and objective of the addendum.

Table 6. A1-3. Percent annual allocation by state using the 0.5% fixed minimum (Step 1, Option A) allocation and the 2009-2011, 2018-2020 and weighted timeframe allocations (Step 2, Options 1-3). Each of the two weighted timeframe combinations of 2009-2011/2018-2020 (Step 2, Option 3A), and 2009-2012/2017-2020 (Step 2, Option 3B) are weighted 25% earlier /75% recent (Sub-Option 1) and 50% recent /50% earlier (Sub-Option 2).

State	Time Frame		2009-2011/2018-2020		2009-2012/2017-2020	
	A1 Status Quo 2009-2011	A2 2018-2020	A3: A-1 25%/75%	A3: A-2 50%/50%	A3: B-1 25%/75%	A3: B-2 50%/50%
ME	0.52%	5.00%	3.88%	2.76%	3.47%	2.48%
NH	0.50%	1.14%	0.98%	0.82%	0.87%	0.74%
MA	1.27%	2.04%	1.85%	1.66%	1.70%	1.52%
RI	0.52%	0.57%	0.56%	0.54%	0.62%	0.58%
CT	0.52%	0.58%	0.56%	0.55%	0.56%	0.54%
NY	0.69%	0.92%	0.86%	0.81%	0.85%	0.79%
NJ	10.87%	11.25%	11.17%	11.09%	11.60%	11.85%
PA	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
DE	0.51%	0.53%	0.52%	0.52%	0.52%	0.52%
MD	1.89%	1.15%	1.34%	1.53%	1.42%	1.68%
PRFC	1.07%	1.06%	1.06%	1.07%	1.09%	1.13%
VA	78.66%	73.07%	74.46%	75.84%	74.56%	75.36%
NC	0.96%	0.63%	0.71%	0.79%	0.70%	0.75%
SC	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
GA	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
FL	0.52%	0.55%	0.54%	0.53%	0.55%	0.54%

Table 7. A4A and A4B. Percent annual allocation by state using the 0.5% fixed minimum allocation (Step 1, Option A) and the three year moving average allocation (Step 2, Option 4A or Option 4B), as it would have changed through time, and the year the timeframe would have been used to set allocations. Note: Since the TAC was not exceeded for any of the timeframes below, Options 4A and 4B produce the same allocation percentages.

State	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020
ME	0.52%	0.51%	0.51%	0.51%	0.51%	0.97%	1.64%	2.76%	3.85%	5.00%
NH	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.52%	0.85%	1.14%
MA	1.27%	0.91%	0.77%	0.95%	1.09%	1.13%	1.24%	1.46%	1.69%	2.04%
RI	0.52%	0.52%	0.52%	0.55%	0.71%	0.72%	0.82%	0.71%	0.69%	0.57%
CT	0.52%	0.51%	0.51%	0.51%	0.51%	0.51%	0.53%	0.59%	0.59%	0.58%
NY	0.69%	0.67%	0.68%	0.70%	0.77%	0.79%	0.85%	0.77%	0.72%	0.92%
NJ	10.93%	13.45%	13.94%	12.81%	10.67%	10.89%	11.25%	11.41%	11.23%	11.25%
PA	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
DE	0.51%	0.52%	0.52%	0.53%	0.53%	0.53%	0.52%	0.52%	0.52%	0.53%
MD	1.90%	2.18%	2.33%	2.52%	2.16%	2.02%	1.71%	1.38%	1.18%	1.15%
PRFC	1.07%	1.20%	1.30%	1.41%	1.23%	1.15%	1.06%	1.11%	1.06%	1.06%
VA	78.60%	76.18%	75.57%	76.30%	78.57%	78.04%	77.15%	76.08%	74.92%	73.07%
NC	0.96%	0.83%	0.80%	0.64%	0.68%	0.67%	0.66%	0.64%	0.65%	0.63%
SC	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
GA	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
FL	0.52%	0.52%	0.54%	0.55%	0.57%	0.57%	0.57%	0.56%	0.55%	0.55%
Year in Use	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**

Table 8. A4C. Percent annual allocation by State using the three tier minimum allocation (Step 1, Option A) and the three year moving average allocation without EESA or IC/SSF landings (Step 2, Option 4C), as it would have changed through time, and the year the timeframe would have been used to set allocations.

State	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020
ME	0.52%	0.51%	0.51%	0.51%	0.51%	0.70%	0.73%	1.28%	1.62%	2.15%
NH	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.52%	0.86%	1.16%
MA	1.27%	0.91%	0.77%	0.96%	1.10%	1.14%	1.26%	1.48%	1.73%	2.06%
RI	0.52%	0.52%	0.52%	0.52%	0.52%	0.53%	0.53%	0.58%	0.57%	0.57%
CT	0.52%	0.51%	0.51%	0.51%	0.51%	0.51%	0.52%	0.58%	0.58%	0.58%
NY	0.69%	0.67%	0.69%	0.68%	0.69%	0.65%	0.65%	0.63%	0.64%	0.91%
NJ	10.93%	13.45%	13.98%	12.88%	10.77%	11.00%	11.46%	11.63%	11.52%	11.60%
PA	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
DE	0.51%	0.52%	0.52%	0.52%	0.51%	0.51%	0.51%	0.52%	0.52%	0.53%
MD	1.90%	2.18%	2.15%	2.16%	1.62%	1.65%	1.51%	1.33%	1.20%	1.17%
PRFC	1.07%	1.20%	1.23%	1.26%	1.03%	1.03%	0.98%	1.06%	1.03%	1.08%
VA	78.60%	76.18%	75.80%	76.82%	79.52%	79.08%	78.68%	77.73%	77.04%	75.49%
NC	0.96%	0.83%	0.81%	0.64%	0.68%	0.67%	0.66%	0.65%	0.65%	0.64%
SC	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
GA	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
FL	0.52%	0.52%	0.53%	0.53%	0.53%	0.53%	0.52%	0.53%	0.54%	0.55%
Year in Use	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**

Table 9. B1-3. Percent annual allocation by state using the two tier minimum (Step 1, Option B) allocation and the 2009-2011, 2018-2020 and weighted timeframe allocations (Step 2, Options 1-3). Each of the two weighted timeframe combinations of 2009-2011/2018-2020 (Step 2, Option 3A), and 2009-2012/2017-2020 (Step 2, Option 3B) are weighted 25% earlier /75% recent (Sub-Option 1) and 50% recent /50% earlier (Sub-Option 2).

State	Time Frame		2009-2011/2018-2020		2009-2012/2017-2020	
	B1 2009-2011	B2 2018-2020	B3: A-1 25%/75%	B3: A-2 50%/50%	B3: B-1 25%/75%	B3: B-2 50%/50%
ME	0.52%	5.12%	3.97%	2.82%	3.55%	2.54%
NH	0.50%	1.15%	0.99%	0.83%	0.88%	0.75%
MA	1.29%	2.08%	1.88%	1.69%	1.74%	1.55%
RI	0.52%	0.57%	0.56%	0.55%	0.62%	0.59%
CT	0.52%	0.58%	0.57%	0.55%	0.56%	0.54%
NY	0.70%	0.93%	0.87%	0.81%	0.86%	0.80%
NJ	11.21%	11.54%	11.46%	11.37%	11.90%	12.15%
PA	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
DE	0.02%	0.04%	0.04%	0.03%	0.03%	0.03%
MD	1.94%	1.17%	1.36%	1.55%	1.45%	1.71%
PRFC	1.09%	1.08%	1.08%	1.08%	1.10%	1.15%
VA	80.68%	75.01%	76.42%	77.84%	76.53%	77.35%
NC	0.97%	0.64%	0.72%	0.80%	0.70%	0.76%
SC	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
GA	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
FL	0.03%	0.06%	0.05%	0.05%	0.06%	0.05%

Table 10. B4A and B4B. Percent annual allocation by state using the two tier minimum allocation (Step 1, Option B) and the three year moving average allocation (Step 2, Option 4A or Option 4B), as it would have changed through time, and the year the timeframe would have been used to set allocations. Note: Since the TAC was not exceeded for any of the timeframes below, Options 4A and 4B produce the same allocation percentages.

State	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020
ME	0.52%	0.51%	0.51%	0.51%	0.51%	0.98%	1.67%	2.82%	3.94%	5.12%
NH	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.52%	0.86%	1.15%
MA	1.29%	0.92%	0.78%	0.97%	1.10%	1.15%	1.26%	1.48%	1.73%	2.08%
RI	0.52%	0.52%	0.52%	0.55%	0.72%	0.73%	0.82%	0.72%	0.69%	0.57%
CT	0.52%	0.51%	0.51%	0.51%	0.51%	0.51%	0.53%	0.59%	0.59%	0.58%
NY	0.70%	0.67%	0.69%	0.71%	0.78%	0.80%	0.85%	0.77%	0.72%	0.93%
NJ	11.21%	13.80%	14.29%	13.14%	10.94%	11.17%	11.54%	11.70%	11.51%	11.54%
PA	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
DE	0.02%	0.03%	0.03%	0.04%	0.05%	0.04%	0.03%	0.04%	0.03%	0.04%
MD	1.94%	2.23%	2.38%	2.58%	2.20%	2.06%	1.74%	1.41%	1.20%	1.17%
PRFC	1.09%	1.22%	1.33%	1.44%	1.25%	1.16%	1.08%	1.12%	1.08%	1.08%
VA	80.68%	78.20%	77.57%	78.32%	80.65%	80.11%	79.19%	78.09%	76.90%	75.01%
NC	0.97%	0.84%	0.81%	0.64%	0.68%	0.67%	0.66%	0.65%	0.65%	0.64%
SC	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
GA	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
FL	0.03%	0.03%	0.05%	0.06%	0.08%	0.08%	0.08%	0.07%	0.07%	0.06%
Year in Use	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**

Table 11. B4C. Percent annual allocation by State using the two tier minimum allocation (Step 1, Option B) and the three year moving average allocation without EESA or IC/SSF landings (Step 2, Option 4C), as it would have changed through time, and the year the timeframe would have been used to set allocations.

State	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020
ME	0.52%	0.51%	0.51%	0.51%	0.51%	0.71%	0.73%	1.30%	1.65%	2.20%
NH	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.52%	0.87%	1.17%
MA	1.29%	0.92%	0.78%	0.97%	1.11%	1.16%	1.28%	1.50%	1.76%	2.10%
RI	0.52%	0.52%	0.52%	0.52%	0.52%	0.53%	0.53%	0.58%	0.57%	0.58%
CT	0.52%	0.51%	0.51%	0.51%	0.51%	0.51%	0.52%	0.58%	0.58%	0.59%
NY	0.70%	0.67%	0.69%	0.69%	0.70%	0.66%	0.66%	0.64%	0.65%	0.92%
NJ	11.21%	13.80%	14.34%	13.21%	11.04%	11.28%	11.75%	11.92%	11.81%	11.89%
PA	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
DE	0.02%	0.03%	0.03%	0.03%	0.02%	0.02%	0.02%	0.03%	0.03%	0.04%
MD	1.94%	2.23%	2.19%	2.21%	1.65%	1.68%	1.54%	1.35%	1.22%	1.19%
PRFC	1.09%	1.22%	1.25%	1.28%	1.04%	1.04%	0.99%	1.07%	1.04%	1.10%
VA	80.68%	78.20%	77.80%	78.86%	81.63%	81.17%	80.76%	79.79%	79.08%	77.49%
NC	0.97%	0.84%	0.81%	0.65%	0.69%	0.68%	0.66%	0.65%	0.65%	0.64%
SC	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
GA	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
FL	0.03%	0.03%	0.04%	0.04%	0.04%	0.04%	0.03%	0.04%	0.05%	0.07%
Year in Use	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**

Table 12. C1-3. Percent annual allocation by state using the three tier minimum (Step 1, Option C) allocation the 2009-2011, 2018-2020 and weighted timeframe allocations (Step 2, Options 1-3). Each of the two weighted timeframe combinations of 2009-2011/2018-2020 (Step 2, Option 3A), and 2009-2012/2017-2020 (Step 2, Option 3B) are weighted 25% earlier /75% recent (Sub-Option 1) and 50% recent /50% earlier (Sub-Option 2).

State	Time Frame		2009-2011/2018-2020		2009-2012/2017-2020	
	C1 2009-2011	C2 2018-2020	C3: A-1 25%/75%	C3: A-2 50%/50%	C3: B-1 25%/75%	C3: B-2 50%/50%
ME	0.52%	5.12%	3.97%	2.82%	3.55%	2.54%
NH	0.50%	1.15%	0.99%	0.83%	0.88%	0.75%
MA	1.29%	2.08%	1.88%	1.69%	1.74%	1.55%
RI	0.52%	0.57%	0.56%	0.55%	0.62%	0.59%
CT	0.27%	0.33%	0.32%	0.30%	0.31%	0.29%
NY	0.70%	0.93%	0.87%	0.81%	0.86%	0.80%
NJ	11.21%	11.54%	11.46%	11.38%	11.90%	12.16%
PA	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
DE	0.26%	0.28%	0.28%	0.27%	0.27%	0.27%
MD	1.94%	1.17%	1.36%	1.55%	1.45%	1.71%
PRFC	1.09%	1.08%	1.08%	1.08%	1.10%	1.15%
VA	80.70%	75.02%	76.44%	77.86%	76.54%	77.37%
NC	0.72%	0.39%	0.47%	0.55%	0.45%	0.51%
SC	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
GA	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
FL	0.27%	0.30%	0.29%	0.29%	0.30%	0.29%

Table 13. C4A and C4B. Percent annual allocation by State using the three tier minimum allocation (Step 1, Option C) and the three year moving average allocation (Step 2, Option 4A or Option 4B), as it would have changed through time, and the year the timeframe would have been used to set allocations. Note: Since the TAC was not exceeded for any of the timeframes below, Options 4A and 4B produce the same allocation percentages.

State	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020
ME	0.52%	0.51%	0.51%	0.51%	0.51%	0.98%	1.67%	2.82%	3.94%	5.12%
NH	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.52%	0.86%	1.15%
MA	1.29%	0.92%	0.78%	0.97%	1.10%	1.15%	1.26%	1.48%	1.73%	2.08%
RI	0.52%	0.52%	0.52%	0.55%	0.72%	0.73%	0.82%	0.72%	0.69%	0.57%
CT	0.27%	0.26%	0.26%	0.26%	0.26%	0.26%	0.28%	0.34%	0.34%	0.33%
NY	0.70%	0.67%	0.69%	0.71%	0.78%	0.80%	0.85%	0.77%	0.72%	0.93%
NJ	11.21%	13.80%	14.30%	13.14%	10.94%	11.17%	11.54%	11.71%	11.52%	11.54%
PA	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
DE	0.26%	0.27%	0.27%	0.28%	0.29%	0.28%	0.27%	0.28%	0.27%	0.28%
MD	1.94%	2.23%	2.38%	2.58%	2.20%	2.06%	1.74%	1.41%	1.20%	1.17%
PRFC	1.09%	1.22%	1.33%	1.44%	1.25%	1.17%	1.08%	1.12%	1.08%	1.08%
VA	80.70%	78.22%	77.59%	78.34%	80.67%	80.12%	79.21%	78.11%	76.91%	75.02%
NC	0.72%	0.59%	0.56%	0.40%	0.43%	0.42%	0.41%	0.40%	0.40%	0.39%
SC	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
GA	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
FL	0.27%	0.27%	0.29%	0.30%	0.32%	0.32%	0.32%	0.31%	0.31%	0.30%
Year in Use	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**

Table 14. C4C. Percent annual allocation by State using the three tier minimum allocation (Step 1, Option C) and the three year moving average allocation without EESA or IC/SSF landings (Step 2, Option 4C), as it would have changed through time, and the year the timeframe would have been used to set allocations.

State	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020
ME	0.52%	0.51%	0.51%	0.51%	0.51%	0.71%	0.73%	1.30%	1.65%	2.20%
NH	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.52%	0.87%	1.18%
MA	1.29%	0.92%	0.78%	0.97%	1.11%	1.16%	1.28%	1.50%	1.76%	2.10%
RI	0.52%	0.52%	0.52%	0.52%	0.52%	0.53%	0.53%	0.58%	0.57%	0.58%
CT	0.27%	0.26%	0.26%	0.26%	0.26%	0.26%	0.27%	0.33%	0.33%	0.34%
NY	0.70%	0.67%	0.69%	0.69%	0.70%	0.66%	0.66%	0.64%	0.65%	0.92%
NJ	11.21%	13.80%	14.34%	13.21%	11.05%	11.28%	11.75%	11.92%	11.82%	11.89%
PA	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
DE	0.26%	0.27%	0.27%	0.27%	0.26%	0.26%	0.26%	0.27%	0.27%	0.28%
MD	1.94%	2.23%	2.19%	2.21%	1.65%	1.68%	1.54%	1.35%	1.22%	1.19%
PRFC	1.09%	1.22%	1.25%	1.28%	1.04%	1.04%	0.99%	1.07%	1.04%	1.10%
VA	80.70%	78.22%	77.82%	78.87%	81.64%	81.19%	80.77%	79.81%	79.10%	77.50%
NC	0.72%	0.59%	0.56%	0.40%	0.44%	0.43%	0.41%	0.40%	0.40%	0.39%
SC	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
GA	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%	0.01%
FL	0.27%	0.27%	0.28%	0.28%	0.28%	0.28%	0.27%	0.28%	0.29%	0.31%
Year in Use	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**

3.2 EESA Program

Objective: Ensure sufficient access to episodic changes in regional availability in order to minimize in-season disruptions and reduce the need for quota transfers and IC/SSF landings.

3.2.1 Increase the Set-Aside

Goal: In combination with reallocation or separately, ensure the states of Maine to New York have increased bait quota for this program to reduce the need for in-season quota transfers or reliance on the IC/SSF provision in response to the increased presence of Atlantic menhaden biomass in the Northeast.

For both Options 1 and 2, the mandatory provisions, declaring participation, procedure for unused set aside, and procedure for set aside overages (Sections 4.3.6.1- 4.3.6.4) as outlined in Amendment 3 (Section 4.3.6.3) will remain in effect.

For Option 2 only, there are two sub-options for the Board's consideration. To allow for additional flexibility in managing the EESA depending on states' allocations and the need to reduce quota transfers, the following sub-options allow for the EESA to be set during the TAC setting process, rather than through adaptive management as outlined in Amendment 3.

Option 1. Status Quo (1%) – The EESA would remain at 1% of the total coastwide TAC. Should any quota remain unused after October 31st, annually, it would revert back into the common pool.

Option 2. Increase up to 5% - This option would allow the Board to increase the EESA to a specific percentage greater than or equal to 1% and less than or equal to 5%. The designated percentage of EESA would be subtracted from the total coastwide TAC prior to the distribution of allocation to states. Depending upon the option(s) chosen under Section 3.1, re-adjusting the fixed minimum quota could offset the possible increase in the EESA (see note below).

Sub-option 1. EESA is set as a static amount of 1-5%: The Board may choose an EESA between 1 and 5% and the chosen option is static until a subsequent Amendment or Addendum.

Sub-option 2. Set the EESA during Specifications at an amount between 1-5%: Under this option the Board will be set the EESA at an amount between 1 to 5% during the Specification process as part of approving the TAC. The TAC and EESA may be set annually or on a multi-year basis depending on Board action.

Note (only applies if a tiered minimum approach is selected): The 0.5% fixed minimum from Amendment 3 allocated 8.0% of the TAC prior to timeframe based allocation of state quotas. If the fixed minimum was replaced by either the two-tiered or three-tiered minimum allocation strategy, the 8.0% would be reduced to 5.55% (two-tiered) or 5.53% (three-tiered),

respectively. The amount of quota left by selecting either of these tiered options, 2.45% (two-tiered) or 2.47% (three-tiered), will be reallocated to the states, but increasing the EESA to 2.47% or less will result in a similar value in pounds being removed from the TAC prior to time frame based allocation. In Amendment 3, nine percent of the TAC either went to the EESA or the fixed minimum allocation.

3.3 IC/SSF Provision

Objective: Sufficiently constrain landings to achieve overall management goals of: 1) meeting the needs of existing fisheries, 2) reducing discards, and 3) indicating when landings can occur and if those landings are a part of the directed fishery.

In this section, there are five sub-topics to address IC/SSF landings. They include proposed changes to the timing of when states can begin landing under this provision (3.3.1); permitted gear types (3.3.2); changes to the IC/SSF trip limit (3.3.3); considering a new accountability system for IC/SSF landings (3.3.4); and changes to when states can access the EESA (3.3.5).

3.3.1 Timing of IC/SSF Provision

Goal: Address the timing of when a state begins fishing under the provision since it impacts the duration that landings occur.

Option 1. No change (Status quo): Once a quota allocation is reached for a given state, the fishery moves to an incidental catch fishery. Currently, individual states interpret "*after a quota allocation is met for a given state*" differently (i.e., whether this refers to the entire allocation or a sector, fishery, or gear allocation).

Option 2. Sector/fishery/gear type allocation within a state is met: Currently, states such as New Jersey and Virginia further divide their state allocation into sector and gear type specific allocations. The provision would confirm that once a sector/fishery/gear type specific allocation is reached for a state, that state's sector/fishery/gear type fishery can begin landing catch under the provision.

Option 3. Entire states allocation met: Once the entire quota allocation for a given state is reached, regardless of sector/fishery/gear type fishery allocations, the menhaden fishery moves to landing under the IC/SSF provision.

Option 4. Full closure when allocation met, no IC/SSF provision: Once the entire quota allocation for a given state is reached, regardless of sector/fishery/gear type fishery allocations, the menhaden fishery is closed, and no landings of menhaden are permitted by that state. If this option is selected, Sections 3.3.2, 3.3.3, and 3.3.4 below are no longer needed.

3.3.2 Permitted Gear Types of the of IC/SSF Provision
If option 4 of section 3.2.1 is selected this will no longer be applicable

Goal: Address the volume of landings under the provision by removing specific gear types

Option 1. No changes to permitted gear types (Status quo): The provision would apply to both small-scale directed gears and non-directed gears. Small scale directed gears shall include cast nets, traps (excluding floating fish traps), pots, haul seines, hook and line, bag nets, hoop nets, hand lines, trammel nets, bait nets, and purse seines which are smaller than 150 fathoms long and eight fathoms deep. Non-directed gears include pound nets, anchored/stake gillnets, drift gill net, trawls, fishing weirs, fyke nets, and floating fish traps.

Option 2. No purse seines, all other small-scale and non-directed gears maintained: The provision would apply to both small-scale directed gears and non-directed gears, but exclude purse seine gears. This option is included due to the growth of directed landings from small-scale purse seine gears in recent years (Table 6). Landings from purse seine gears would count against a state's directed fishery quota.

Option 3. Non-directed gears only: The provision shall apply to non-directed gears only. Under Amendment 3 this includes pound nets, anchored/stake gillnets, drift gill net, trawls, fishing weirs, fyke nets, and floating fish traps.

3.3.3 Trip Limit for Directed Small-Scale Fisheries of IC/SSF Provision
If option 4 of section 3.2.1 is selected this will no longer be applicable

Goal: Limit the annual volume of IC/SSF landings by reducing the trip limit.

The options below modify the trip limits for directed small-scale fisheries. Stationary multi-species gears are defined as pound nets, anchored/stake gill nets, fishing weirs, floating fish traps, and fyke nets. A trip is based on a calendar day such that no vessel may land menhaden more than once in a single calendar day. The use of multiple carrier vessels per trip to offload any bycatch exceeding the daily trip limit of Atlantic menhaden is prohibited. If Option 3 was selected in section 3.3.2 above, this section is no longer needed.

Option 1. No change to trip limit (Status quo): small-scale gears and non-directed gear types may land up to 6,000 pounds of menhaden per trip per day. Two authorized individuals, working from the same vessel fishing stationary multi-species gear, are permitted to work together and land up to 12,000 pounds from a single vessel – limited to one vessel trip per day.

For both Options 2 and 3 below, the proposed change in the trip limit would only apply to small-scale directed gears which include cast nets, traps (excluding floating fish traps), pots, haul seines, hook and line, bag nets, hoop nets, hand lines, trammel nets, bait nets, and purse

seines which are smaller than 150 fathoms long and 8 fathoms deep. Non-directed gears and stationary multi-species gears would still be able to land up to 6,000 pounds of menhaden per trip per day, with two individuals working from the same vessel fishing stationary multi-species gear, permitted to work together can land up to 12,000 pounds.

Option 2. 4,500 pound trip limit for directed gear types: The trip limit for the directed small-scale fishery shall be 4,500 pounds of menhaden per trip per day.

Option 3. 3,000 pound trip limit for directed gear types: The trip limit for the directed small-scale fishery shall be 3,000 pounds of menhaden per trip per day.

3.3.4 Catch Accounting of IC/SSF Provision*

If option 4 of section 3.2.1 is selected this will no longer be applicable

Goal: Create a system where annual IC/SSF landings are limited and there is accountability for overages.

For Options 2-4, any adjustments to the TAC or possible IC/SSF set aside will not take effect in the following year if there is an overage. This is due to the timing of when preliminary landings are available, the fishing season, and the annual process of finalizing initial state quotas. For example, in Options 3 or 4, if reported 2022 total landings from state compliance reports exceeded the 2022 TAC or IC/SSF set-aside, then the TAC or set aside in 2024 would be reduced based on the overage.

Option 1. IC/SSF landings do not count against a state allocation nor the annual TAC (status quo): Landings under this provision will be reported as a part of the annual FMP Review (Amendment 3, Section 5.3: Compliance Report). Landings are reported by states as a part of Annual Compliance Reports. Should a specific gear type show a continued and significant increase in landings under the provision, or it becomes clear that a non-directed gear type is directing on menhaden under this provision, the Board has the authority, through adaptive management (Amendment 3, Section 4.6), to alter the trip limit or remove that gear from the IC/SSF provision.

Option 2. IC/SSF Management Trigger and Response

- 2A: IC/SSF Management Triggers

Sub-Option 1. Catch cap equal to 1% of the annual TAC and 10% exceedance management trigger: Landings under the IC/SSF provision shall have a catch cap equal to 1% of the TAC. The cap is not a set aside and landings would still not count against the TAC. Landings are reported by states to as a part of Annual Compliance Reports. If reported landings exceed the cap by more than 10% in a single year or exceeds the cap two years in a row (management trigger), regardless of the percent overage, the management trigger is tripped and the Board must take action as specified in Option 2B below.

Commented [TK5]: The PDT recommends all options under section 3.3.4 IC/SSF be removed due to the complexity of catch accounting based on preliminary landings and the timing of when accountability would be implemented. As a whole, the PDT believes these options are not effective or efficient, and the goal of the catch accounting approach can be achieved through a combination of the reallocation alternatives and IC/SSF sub-topics (gear restrictions and trip limit). Even after editing the options in this topic based on Board direction from February, the PDT's concerns all still remain and urge the Board to remove this section entirely.

Sub-Option 2: 1% set-aside of the annual TAC exceedance management trigger: Landings under this provision shall count against a 1% set-aside of the overall TAC set annually at the beginning of the fishing season. If the set aside is exceeded in a given year, the trigger is tripped and the Board must take action as specified in Option 2B below.

Sub-Option 3. IC/SSF landings annual TAC exceedance management trigger: Total landings under this provision would be evaluated against the annual TAC. If IC/SSF landings cause the TAC to be exceeded, meaning the TAC is exceeded after adding total IC/SSF landings to total landings that occur under state quotas and EESA, the trigger is tripped, and the Board must take action as specified in Option 2B below.

- 2B: IC/SSF Management Trigger Response

  Sub-Option 1. If the IC/SSF management trigger is tripped, the Board must take action to reduce IC/SSF landings.

  Sub-Option 2. If the IC/SSF management trigger is tripped, the overage will be deducted on a pound for pound basis in the subsequent year (e.g., an overage from 2022 would be paid back in the 2024 fishing year). Under this sub-option, the overage would be deducted from either the IC/SSF set-aside or the overall TAC, depending on which sub-option is selected under Option 2A above.

3.3.5 Allow access to EESA at <100% state allocation*

The following two options can only be chosen if under section 3.3.2 Permitted Gear Types Options 2 or 3 are selected or if option 4 is selected under section 3.3.1.

States are currently required to fully use their allocated quota before entering the EESA program. Several states currently have small-scale purse seines that operate under their directed fishery and again under the IC/SSF provision once a state's quota has been fully harvested. Options 2 and 3 above under 3.3.2 Permitted Gear Types would remove small-scale purse seines from the IC/SSF provision. This could potentially cause negative impacts to current small-scale purse seine operations in several states. Allowing states the opportunity to fish under the EESA before reaching 100% of their directed fishery quota could allow for their directed small-scale purse seine fishery to continue without interruption or closure**.** Accounting for landings and determining whether to apply landings to the EESA or directed quota in-season if the quota is not fully met may be challenging.

Commented [TK6]: The PDT recommends removal of this issue because it may lead to fairness/equity concerns as five percent of one state's allocation may be significantly different than that of another state.

Option 1. No change in when states can apply to participate in EESA (Status Quo). The following language from Amendment 3 will be maintained, with the exception of the percentage set aside if option B2 is chosen in Section 3.2 above:

1% of the TAC is set aside for episodic events, which are defined by any instance in which a qualified state has reached its annual quota allocation available to them prior to September 1 and the state can prove the presence of unusually large amounts of menhaden in its state waters

Option 2. Qualified states can begin fishing under the EESA once they have landed or are projected to land 95% of their quota. – Under this option, a state could participate in EESA without having fully used their allocation. The 5% reserve of a state's allocated quota could then be used once the EESA has closed and allow a state the continuation of their small-scale purse seine fishery. The process for declaring participation into the EESA as outlined in Amendment 3 would be changed to the following:
The applying state has harvested 95% of its annual quota allocation prior to September 1.

The state must include in their letter declaring interest in harvesting under the set aside the date they will request to start fishing under the EESA, the projected quota the state has remaining at the time the letter was submitted, and confirmation that the state will notify the ASMFC Executive Director the date which the state ends fishing under the EESA.

4. COMPLIANCE SCHEDULE

If the existing Atlantic menhaden management plan is revised by approval of this draft addendum, the measures would be effective January 1, 2023. Unless otherwise directed by the Board, allocations will be revisited no more than 3 years (2025) following implementation of this addendum, as outlined in Amendment 3.

5. LITERATURE CITED

ASMFC. 2012. Amendment 2 to the Atlantic Menhaden Fishery Management Plan. ASMFC, Arlington, VA 114 p.

ASMFC. 2016. Addendum I to Amendment 2 to the Atlantic Menhaden Fishery Management Plan. ASMFC, Arlington, VA 7 p.

ASMFC. 2017. Amendment 3 to the Atlantic Menhaden Fishery Management Plan. ASMFC, Arlington, VA 111 p.

Bigelow, H.B., and Schroeder, W.C. 2002. Fishes of the Gulf of Maine. 3rd ed. Edited by B.B. Collette and G. Klein-MacPhee. Smithsonian Institution Press, Washington, D.C.

Atlantic States Marine Fisheries Commission

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MEMORANDUM

TO: **Atlantic Menhaden Management Board**

FROM: **Atlantic Menhaden Plan Development Team**

DATE: **April 19, 2022**

SUBJECT: **Recommendations on Draft Addendum I to Amendment 3**

At the 2022 Winter Meeting, the Atlantic Menhaden Management Board provided guidance to the Plan Development Team (PDT) in further developing draft Addendum I to Amendment 3. The addendum considers changes to commercial allocations, the episodic event set aside (EESA) program, and the incidental catch and small-scale fisheries (IC/SSF) provision. This memo summarizes the PDT recommendations for the Board's consideration in approving the document for public comment.

Each section below includes justification for modifying and/or eliminating specific options. A decision tree for selecting state allocations is included in the Appendix. The topics are interconnected such that decisions made for one topic will impact alternatives under other topics. Because of this interconnectedness, the Board should carefully consider removal of some options to reduce complexity of the document. This will allow the public to effectively provide feedback to the Board before final action. Currently there are 48 total options in the Draft Addendum (27 combinations of allocation options; 5 options for the EESA program; and 16 options for the IC/SSF provision). **The PDT is very concerned with the number of options in the document, particularly under allocation and the IC/SSF sections, having 27 allocation options will make it very difficult for the public to discern the differences in the allocation approaches and provide comment on the options. In addition, such a large number of allocations options will be challenging to present to the public in a two hour public hearing, particularly to clearly demonstrate the differences between the options.**

2020 Commercial Landings Adjustments

In March, additional information was brought to the PDT regarding whether 2020 landings were representative due to the impacts of COVID-19, specifically the PDT heard a proposal from the State of Virginia to allow for adjusted 2020 landings data to account for fishing days lost to the COVID-19 pandemic. The PDT was concerned all states' fisheries may have been impacted by COVID-19, the extent of which is unknown and possibly variable; therefore, if the Board was going to allow for adjusted data, then all states should have the opportunity to bring forward proposals.

The Virginia proposal presented the PDT with evidence that 2020 landings are atypical of the recent time series. Not all states experienced impacts to their fisheries in 2020, and the impacts were disproportional across states. The PDT notes that addressing this issue could set a precedent for using 2020 data for allocation as well as set a precedent for not using it. The Menhaden Board may consider recommending the ISFMP Policy Board consider the utility of 2020 data in management decisions. The Policy Board could consider an overarching policy for this issue, although such a policy may be difficult due to the differing degree of data collected for each species' harvest.

The PDT developed the following four options to be considered by the Board, along with their potential impacts on the timeline of approval for Draft Addendum I, so the PDT can make the necessary changes to the Draft Addendum and all allocation options. **Of the options below, the PDT prefers option 4.** Table 1 provides information on the positive and negative impacts of the four options.

1. Status Quo: Continue to use data through 2020 and not allow for any changes to previously validated data. This would have no impact on the draft Addendum's timeline and implementation for 2023. Based on discussions with the PDT members who reviewed their states' 2020 data, the PDT has determined it is an abnormal year for more than one state.

2. Allow for adjustments to the 2020 data. All states would have the opportunity to present proposals for adjustments to their 2020 landings due to impacts from COVID-19. This would delay the Addendum process and could impact the ability to implement by 2023. The PDT is concerned about the precedent this would set for other species and that the process to develop standards to review proposals and the time to draft and review proposals would be a complicated and time-consuming process.

3. Remove 2020 data from the time series. Because there are concerns 2020 data was impacted by COVID-19, it could be dropped from the time series the Board is using to set menhaden allocations. This could delay the draft Addendum by one meeting cycle but the PDT does not anticipate this would delay implementation in 2023. Final action could be taken on the document at the Commission's Annual meeting. By removing 2020 data, the PDT is concerned the data time series will not reflect recent fishing activity. The most recent year would be 2019, which would be impacting management in 2023.

4. Remove 2020 data and add 2021 to the time series. This could delay the draft Addendum by one meeting cycle but the PDT does not anticipate it would delay implementation in 2023. By adding 2021 to the time series, it would alleviate the concerns the PDT has with only dropping 2020 data by allowing an additional year of data in the analysis that better reflects current fishing activity. This option is the preferred option of the PDT.

Table 1. Description of impacts of the four landing adjustment options

Option	Pros	Cons	Timeline impact	Other Considerations
Option 1: Status quo	Continuous time series	COVID-19 impacts to landings and effort	None: Data have been validated	
Option 2: Allow for changes to 2020	Could allow for adjustments to address COVID-19 impacts	Potential for a difficult process; A consistent process must be developed for submission, review and approval; Could be difficult to justify adjustments due to data limitations; Significant administrative burden for analysis and review	Significant Delay: Will not be able to implement in 2023	What body will determine if a rationale is a justified reason for change; In the end, changes may not accurately reflect the impact of COVID-19 because the availability of fish, as a moving target, makes this very difficult
Option 3: Drop 2020 data	Removes the uncertainty of COVID-19 impacted data; The data through 2019 has been validated	Not reflective of the most current data for changes in availability and effort that have occurred with newly available fish; Ending in 2019 does not address the goal of the addendum to reflect the current distribution of fish and the fishery	Delay of 1 Board meeting cycle to allow the PDT to make changes to the draft addendum; data has been validated; Implementation in 2023 possible	
Option 4: Drop 2020 & add 2021	More reflective of the most current data for changes in availability and effort that have occurred with newly available fish; Minimizes the COVID-19 impacts to the time series; Prevents the need for a cumbersome process of state-by-state 2020 landing adjustments		Delay of 1 Board meeting cycle to allow 2021 data to be validated and allow the PDT to make changes to the draft addendum; Implementation in 2023 possible	

Commercial Allocations

3.1.1 Fixed Minimum Allocations

Options B. and C. Two- and Three-tiered Fixed Minimum: The tiered fixed minimum approaches were originally drafted to provide the Board with alternatives that reduced the amount of TAC that was reserved for minimum allocations, while still allowing for states to acquire the necessary allocation through whichever time series would be chosen in 3.1.2. After the Board reassigned states to different tiers in the three-tiered option in February, the difference between the sum of minimums between Options B and C is now 0.02%, essentially creating no distinguishable difference between the two options. In addition, the PDT notes in altering the three-tier option the Board moved a few states from the lowest tier (0.01%) to the middle tier (0.25%), but those same states remain in the lowest tier (0.01%) in the two-tiered option. These states were placed in the lowest tier (0.01%) in both options because the PDT determined these minimums, combined with IC/SSF options in the addendum, would be sufficient to cover the minimal amount of landings these states have landed over the past 12 years. Therefore the PDT supports the original configuration of the options. **The PDT recommends either restoring the original draft of the options or removing one of the new fixed minimum approaches approved in February (option 3.1.1 B or C).** The PDT is concerned the Board has misunderstood the overall outcome of the fixed minimum approach. Under the original options there would be very few instances of lower tiered states exceeding their allocations at the end of the allocation process. However, those states that come up short (very minimal) would be "made whole" under the additional provisions (IC/SSF). The states that come up short do not have high volume landings thus would be able to land using IC/SSF, even if the IC/SSF were restricted (by gear type) through this addendum.

3.1.2 Timeframe for Allocating Remaining Available TAC

Option 4. Moving Average: In response to Board concerns about the types of landings that can affect the moving average (i.e. episodic and IC/SSF), the PDT split Option 4 into three sub-options, 4A-C. The PDT has drafted two new options based on Board feedback.

Option 4A represents the original moving average method that includes all catch types, including EESA and IC/SSF landings, to most accurately reflect the distribution of the stock and effort. **The PDT continues to support the retention of this option as it is the most responsive to the current fishery, but if the TAC is exceeded it could impact states that use their full quota.**

Option 4B only uses landings under or equal to the TAC in the moving average calculation. This option recognizes the importance of IC/SSF and EESA landings in a state's total landings when there is "extra" fish available, such as when a state does not achieve its allocation due to low availability or low market demands. However, it does not reward states for activities that could

lead to overfishing (exceeding the TAC) and/or damage existing markets in other states (shifting quota from states that fully utilize their allocation). Proportional allocation of IC/SSF and EESA landings among participating states eliminates concerns about differences in timing/availability of when "extra" fish might be available to those states (e.g. as compared to "first come, first served"). **The PDT supports the retention of this option as it adds protections for states that fully utilize their fishery, but it is not as representative of the current fishery as Option 4A.**

Option 4C would eliminate EESA and IC/SSF landings from the calculation of the moving average, thereby limiting the average to landings acquired under a state's annual allocation or through an official quota transfer. As written, this option no longer achieves the purpose of the moving average by inaccurately representing a state's landings. Using such a limited amount of data in the calculation would not allow for movement of quota in a meaningful way and would not meet the goal and objective of the addendum. In addition, the PDT sees the three year timeframe of the average as sufficient in eliminating the outsized influence of a single year and preventing a race to fish. **The PDT recommends keeping the original version of this option and removing option 4C.**

3.1.2 Timeframe for Allocating Remaining Available TAC

Option 6B. Weighted Allocation Timeframe #2 (2009-2012 and 2017-2020): **The PDT recommends removal of timeframe #2.** The Board requested two versions of the weighted allocation timeframe be developed in October 2021. While the state allocations vary slightly between the two versions, they are conceptually the same. By having two options, it increases the possible state allocation options by four options for a total of 27 options. **The PDT reiterates its recommendation that Timeframe #2 be removed because the same objective is achieved with Timeframe #1, which utilizes the original time series plus the most recent three years.**

Episodic Event Set Aside Program

3.2.1 Increase the Set-Aside

Option 2. Increase up to 5%: For clarity, options related to the timing of establishing the Set-Aside have become sub-options under this option only. These sub-options would allow the Board to decide how the set aside could be adjusted, either as a static value during final action of Addendum I, or dynamically during specification proceedings.

3.3.5 Allow access to EESA at <100% state allocation

This topic is included in the Addendum in the Incidental Catch and Small-Scale Fisheries section due to the decision making process for addressing small-scale purse seines. This option can only

be pursued in the current version of the addendum if either Option 2 (no purse seines) or 3 (non-directed gears only) are chosen under Permitted Gear Types, or if option 4 (elimination of the IC/SSF provision) is selected under Timing of IC/SSF provision.

The PDT notes allowing states to participate in EESA when they have five percent of their allocation remaining may lead to fairness/equity concerns as five percent of one state's allocation may be significantly different than that of another state. Timing and availability of fish among the northern states could exacerbate this issue with one state having access to EESA while still having quota remaining, while another state has not yet had the fish migrate into their state waters and thus has not yet had the opportunity to harvest their quota and opt into EESA. Additionally, several other options in this management document, including revised commercial allocations and increasing the percentage allocated to the EESA, could alleviate the need for this option. **The PDT recommends this option be removed.**

Incidental Catch and Small-Scale Fisheries Provisions

3.3.4 Catch Accounting of the IC/SSF Provision

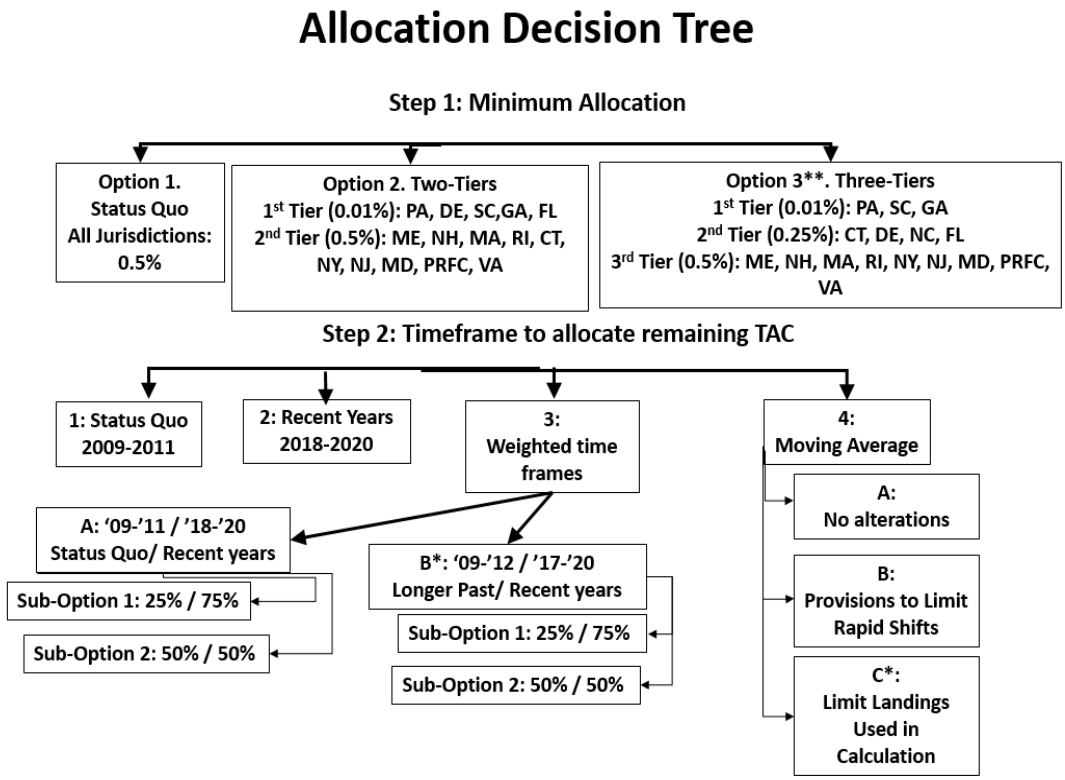
The PDT recommends all options under section 3.3.4 IC/SSF be removed due to the complexity of catch accounting based on preliminary landings and the timing of when accountability would be implemented. Options 2-4 would need to operate under a considerable time lag as landings are not finalized until the fall of the following year. Under Option 2, the Board will be unable to make timely decisions and take action until two years after the management trigger is tripped (e.g., if landings have exceeded the cap more than 10% in 2022, the Board would take action in 2023, and implementation would occur for the 2024 fishing season). Under Options 3 and 4, the proposed adjustments to the TAC or set-aside would similarly not be addressed until two years after an overage occurred (e.g., an overage in 2022 would be applied in 2024). Additionally, Option 3 could result in more latent quota if the set-aside is not fully used. The Board has indicated that latent quota is an issue that should be addressed through this addendum and this option may exacerbate that issue. Finally, both Options 3 and 4 could result in overages caused by a minority of states that impact many states. If there is an overage by one or a few states in one year, it would reduce the available set-aside (Option 3) that all states could access, or potentially reduce all states quotas (Option 4). Additionally, these options could therefore potentially result in a constant overage/payback cycle, creating a new management problem. **As a whole, the PDT believes these options are not effective or efficient, and the goal of the catch accounting approach can be achieved through a combination of the reallocation alternatives and IC/SSF sub-topics (gear restrictions and trip limit)**. **Even after editing the options in this topic based on Board direction from February, the PDT's concerns still remain and they urge the Board to remove this section entirely.**

Appendix A. Decision Tree

The following provides a Decision Tree for selecting state allocations.

*The PDT recommends removing these options

**The PDT recommends either restoring the original version of this option or removing it.



Atlantic States Marine Fisheries Commission

Executive Committee

May 4, 2022
8:00 – 10:00 a.m.
Hybrid Meeting

Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary. A portion of this meeting may be closed for Committee members and Commissioners only.

1. Welcome/Call to Order *(S. Woodward)*

2. Board Consent
   - Approval of Agenda
   - Approval of Proceedings from January 2022

3. Public Comment

4. Review and Consider Approval of the Commission Budget for Fiscal Year 2023 (*L. Leach)* **Action**

5. Consider Changes to the Commission's Appeals Policy (*R. Beal*)

6. Discuss Use of *De Minimis* in Interstate Fishery Management Plans (*T. Kerns*)

7. Conduct the Executive Director's Performance Review (**Closed Session**)

8. Other Business/Adjourn

The meeting will be held at The Westin Crystal City (1800 Richmond Highway, Arlington, VA; 703.486.1111) and via webinar; click here for details

Atlantic States Marine Fisheries Commission

APPEALS PROCESS

Draft revisions for consideration by the Executive Committee on May 4, 2022

Revised by the ISFMP Policy Board February 7, 2019

Background

The Atlantic States Marine Fisheries Commission's interstate fisheries management process is based on the voluntary commitment and cooperation of the states. The involved states have frequently demonstrated their willingness to compromise and the overall process has proven to be very successful. However, there have been instances where a state/jurisdiction has expressed concern that the Board decisions have not been consistent with language of an FMP, resulted in unforeseen circumstances or impacts, did not follow established processes, or were based on flawed technical information. In order to address these concerns, the ISFMP Policy Board charged the Administrative Oversight Committee with "exploring and further developing an appeals process".

Under the current management process the primary policy development responsibility lies with species management boards. And, in the case of development of new fishery management plans or amendments the full Commission has final approval authority prior to implementation. The purpose of the appeals process is to provide a mechanism for a state/jurisdiction to petition for a management decision to be reconsidered, repealed or altered. The appeals process is intended to only be used in extraordinary circumstances where all other options have been exhausted. The management boards have the ability to go back and correct errors or address additional technical information through the recently clarified process on "amending or rescinding previous board actions".

During the December 2003 ISFMP Policy Board meeting, the decision was made to continue to have the Policy Board serve as the deliberative body that will consider valid appeals. This decision is consistent with the language that is included in the ISFMP Charter. However, the Charter does not provide detailed guidance on how an appeal is to be addressed.

This paper details for the Commission appeals process.

Appeal Criteria – The intent of the appeals process is to provide a state with the opportunity to have a decision made by a species management board or section reconsidered by the Policy Board. The following criteria will be used to guide what type of decisions can be appealed. In general, management measures established through the FMP/amendment/addendum process can be appealed. However, the appellant must use one of the following criteria to justify an appeal:

1. Decision not consistent with, or is contrary to, the stated goal and objectives of the current FMP (Goal and Objective Section of FMPs/Amendments or Statement of the Problem Section of Addenda).
2. Failure to follow process as identified in the ISFMP Charter, Rules and Regulations or other ASMFC guiding documents (e.g. conservation equivalency guidance).
3. Insufficient/inaccurate/incorrect application of technical information. Examples can include but are not limited to:
    a. If for any calculations used in the decision, an error which changes the results was identified after the decision was rendered;
    b. If any data used as the basis for a decision, undergoes a modification which impacts results after the decision was rendered (i.e. a landings dataset is adjusted significantly due to a recalibration or application of a control rule adjustment);
    c. If data is incorrectly identified and therefore incorrectly applied, such as a misidentification of landings information as catch information, or incorrectly assigned landings/catch to a jurisdiction;
    d. If information used as the basis for the decision lacked scientific or statistical rigor, thereby calling in to question the sound basis for the decision;
    e. If the historical landings, catch, or abundance time series used as a basis for a decision is found to be incorrect.

Any appeal based on criterion 3 may be verified independently by a technical body appointed by the Chair, as needed.

4. Management actions resulting in unforeseen circumstances/impacts that were not considered by the Board as the management document was developed.

The following issues could not be appealed:

1. Management measures established via emergency action
2. Out-of-compliance findings (this can be appealed but, through a separate, established process)
3. Changes to the ISFMP Charter

Appeal Initiation – The ISFMP Charter provides that a state aggrieved by a management board action can appeal to the ISFMP Policy Board. Any state can request to initiate an appeal; also a group of states can submit a unified request for an appeal. The states are represented on the Commission by three representatives that have the responsibility of acting on behalf of the states' Executive and Legislative branches of government. Therefore, in order to initiate an appeal all seated Commissioners (not proxies) of a state's caucus must agree that an appeal is warranted and must sign the letter submitted to the Commission. If a multi-state appeal is requested all the Commissioners from the requesting states must sign the letter submitted to the Commission. During meetings where an appeal is discussed proxies will be able to

participate in the deliberations. Meeting specific proxies will not be permitted to vote on the final appeal determination, consistent with Commission policy.

A state (or group of states) can request and appeal on behalf of the Potomac River Fisheries Commission, District of Columbia, National Marine Fisheries Service, or the United States Fish and Wildlife Service.

The letter requesting an appeal will be submitted to the Chair of the Commission and include the measure(s) or issue(s) being appealed, the justification for the appeal, and the commitment to comply with the finding of the Policy Board. This letter must also include a demonstration that all other options to gain relief at the management board level have been exhausted. This letter must be submitted via certified mail or email at least **45 days** prior to a scheduled ASMFC Meeting Week. The Commission Chair, Vice-Chair and immediate past Chair will determine if the appeal meets the qualifying guidelines and notify the Policy Board of their decision. If the immediate past chair is no longer a commissioner the Chair will select an alternate from a state that is not affected by the appeal. Also, if the Chair, Vice-Chair or immediate past Chair is a signatory to the appeal, the Chair will select an alternate from a state that is not affected (or minimally affected) by the appeal.

Convene a "Fact Finding" Committee (optional) – Upon review of the appeal documentation, the Commission Chair, Vice-Chair and immediate past Chair (or alternate if necessary, as described above) may establish a "Fact Finding" Committee to conduct analyses and/or compile additional information if necessary. This group will be made up of individuals with the technical expertise (including legal, administrative, social, economic, or habitat expertise if necessary) and familiarity with the fishery to conduct the necessary analysis. If such a committee is convened the schedule included in the last section of this document may need to be adjusted to provide time for the Committee to conduct analyses. The Commission Chair, Vice-Chair and immediate past Chair (or alternate if necessary, as described above) may set a deadline for the Committee to complete its work to ensure the appeal is addressed in a timely manner.

ISFMP Policy Board Meeting – Following the determination that an appeal has met the qualifying guidelines, a meeting of the Policy Board will be convened at a scheduled ASMFC meeting week. The agenda of this meeting will be set to allow sufficient time for all necessary presentations and discussions. The Chair of the Commission will serve as the facilitator of the meeting. If the Chair is unable to attend the meeting or would like to more fully participate in the deliberations, the Vice-Chair of the Commission will facilitate the meeting. The ISFMP Director will provide the background on the development of the management program as well as a summary of the justification provided in the record for the management board's action. The ISFMP Director will also present the potential impacts of the appeal on other affected states. The appellant Commissioners will present their rationale for appealing the decision and provide a suggested solution. The Policy Board will then discuss the presentations and ask any necessary questions. The Policy Board will vote to determine if the management board's action was justified. A simple majority of the Policy Board is required to forward a recommendation to

a management board for corrective action. If the Policy Board determines that the existing management program should be modified, it will issue a finding to that effect as well as any guidance regarding corrective action to the appropriate species management board. The referral may be worded to allow the management board flexibility in determining the details of the corrective action. If the Policy Board requires a management board to take specific corrective actions, those corrective actions must:
Option 1. ….be limited to the management options as written in the Draft Amendment or Addendum reviewed by the public.
Option 2. ….be within the range of management options included in the Draft Amendment or Addendum reviewed by the public.

Upon receipt of the Policy Board's recommendation the management board will discuss the findings and make the necessary changes to address the appeal. The management board is obligated to make changes that respond to the findings of the Policy Board. A simple majority of the management board will be necessary to approve the changes.

If the management board is unable to make the changes necessary to respond to the findings of the Policy Board, the following options are available:

1. The management board can request clarification from the Policy Board on the specifics of the findings. A meeting of the Policy Board will be scheduled to ensure the requested clarification is provided to the management board to take action at the Commission's next quarterly meeting.
2. The management board can inform the Policy Board that it is unable to address the findings and the Policy Board will take action to approve changes to address the appeal.
3. The management board can request additional analyses from the technical committee or other technical support group (e.g. Management and Science Committee, Assessment Science Committee). A meeting of the appropriate technical group will be scheduled to ensure the requested information is provided to the management board to take action at the Commission's next quarterly meeting.

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Appeal Products and Policy Board Authority – Following the Policy Board meeting a summary of the meeting will be developed. This summary will include a detailed description of the findings and will be forwarded to the appropriate management board and Policy Board upon completion. If the Policy Board determines that changes to the management program are necessary, the summary may include guidance to the management board for corrective action. The report of the Policy Board will be presented to the management board for action at the next scheduled meeting.

Considerations to Prevent Abuse of the Appeals Process – The appeals process is intended to be used only in extraordinary situations and is in no way intended to provide a potential avenue to preempt the established board process. The initiation of an appeal will not delay the Commission process for finding a state out of compliance nor delay or impede the imposition of

penalties for delayed compliance.

Limiting Impacts of Appeal Findings – If a state is successful in an appeal and the management program is altered, another state may be negatively impacted by the appeals decision. In order to prevent an appeals "chain reaction," the Policy Board's recommendation and the resulting management board's decision will be binding on all states. All states with an interest in the fishery will be obligated to implement the changes as approved by the management board. Upon completion of the appeals process, a state is not precluded from taking further action beyond the Commission process to seek relief.

If the Policy Board supports the appeal and determines that corrective action is warranted, the potential for management changes to negatively impact other states will be evaluated by the Policy Board and the species management board.

Appeals Process Timeline

1. Within **15 working days** of receipt of a complete appeal request the Commission Chair, Vice-Chair, and immediate past chair (or alternate) will determine if the state has an appeal which meets the qualifying guidelines.

2. Upon a finding that the appeal meets the qualifying guidelines, the appeal will be included on the agenda of the ISFMP Policy Board meeting scheduled during the next ASMFC Meeting Week (provided an adequate time period is available for preparation of the necessary documentation).

3. Following the finding that an appeal meets the qualifying guidelines, Commission staff and the appellant commissioners will have a minimum of **15 working days** to prepare the necessary background documents.

4. The background documents will be distributed at least **15 days** prior to the Policy Board meeting.

5. If the management board requests additional information from the Policy Board or a technical support group, a meeting of the Policy Board or technical support group will be scheduled as quickly as practical to allow the management board to take action at the Commission's next quarterly meeting.

A summary of the Policy Board meeting will be developed and distributed to all Commissioners within **15 working days** of the conclusion of the meeting.

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Atlantic States Marine Fisheries Commission

Coastal Sharks Management Board

May 4, 2022
10:15 – 11:15 a.m.
Hybrid Meeting

Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary.

1.	Welcome/Call to Order (*M. Bell*)	10:15 a.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings from October 2021	10:15 a.m.
3.	Public Comment	10:20 a.m.
4.	Consider Zero Retention Limit/Closure of the Shortfin Mako Fishery **Final Action** • Overview of the NOAA Fisheries Proposed Rule (*K. Brewster-Geisz*)	10:30 a.m.
5.	Other Business/Adjourn	11:15 a.m.

The meeting will be held at The Westin Crystal City (1800 Richmond Highway, Arlington, VA; 703.486.1111) and via webinar; click here for details

MEETING OVERVIEW

ISFMP Policy Board
Wednesday May 4, 2022
10:15 – 11:15 a.m.
Hybrid Meeting

Chair: Mel Bell (NC) Assumed Chairmanship: 05/21	Technical Committee Chair: Angel Willey (MD)	Law Enforcement Committee Representative: Greg Garner (SC)
Vice Chair: Erika Burgess (FL)	Advisory Panel Chair: Vacant	Previous Board Meeting: October 20, 2021
Voting Members: MA, RI, CT, NY, NJ, DE, MD, VA, NC, SC, GA, FL, NMFS (13 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from October 20, 2021

3. Public Comment – At the beginning of the meeting public comment will be taken on items not on the agenda. Individuals that wish to speak at this time must sign-in at the beginning of the meeting. For agenda items that have already gone out for public hearing and/or have had a public comment period that has closed, the Board Chair may determine that additional public comment will not provide additional information. In this circumstance the Chair will not allow additional public comment on an issue. For agenda items that the public has not had a chance to provide input, the Board Chair may allow limited opportunity for comment. The Board Chair has the discretion to limit the number of speakers and/or the length of each comment.

4. Consider Closing the Shortfin Mako Fishery Final Action (10:30-11:15 a.m.)

Background

- NOAA Fisheries recently published a proposed rule **(Briefing Materials)** that would establish a flexible shortfin mako shark retention limit with a default limit of zero in commercial and recreational HMS fisheries.
- The change in the retention limit to zero is to implement the 2021 International Commission for the Conservation of Atlantic Tunas (ICCAT) recommendation. NOAA Fisheries proposes to leave the default limit of zero in place until changed. During the fishing year, NOAA Fisheries could increase the shortfin mako shark retention limit from the default, or subsequently decrease the retention limit, for the commercial fishery, the recreational fishery, or both, based on regulatory criteria and retention allowed by ICCAT.
- NOAA conducted a public hearing for the proposed rule on April 27th.
- The Commission could consider closure of the shortfin mako fishery to have consistent regulations as federal waters.

Presentations

- Staff will present an overview of the NOAA Fisheries Proposed Rule.

Board action for consideration at this meeting

- Consider a zero retention limit/closure of the shortfin mako fishery.

5. Other Business/Adjourn

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

COASTAL SHARKS MANAGEMENT BOARD

Webinar
October 20, 2021

These minutes are draft and subject to approval by the Coastal Sharks Management Board.
The Board will review the minutes during its next meeting.

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INDEX OF MOTIONS

ATTENDANCE

Board Members

Dan McKiernan, MA (AA)
Raymond Kane, MA (GA)
Sarah Ferrara, MA, proxy for Rep. Peake (LA)
Jason McNamee, RI (AA)
David Borden, RI (GA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
Justin Davis, CT (AA)
Bill Hyatt, CT (GA)
John Maniscalco, NY, proxy for J. Gilmore (AA)
John McMurray, NY, proxy for Sen. Kaminsky (LA)
Heather Corbett, NJ, proxy for J. Cimino (AA)
Tom Fote, NJ (GA)
Adam Nowalsky, NJ, proxy for Asm. Houghtaling (LA)
John Clark, DE (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Mike Luisi, MD, proxy for B. Anderson (AA)
Russell Dize, MD (GA)
Lewis Gillingham, VA, proxy for S. Bowman (AA)
Shanna Madsen, VA, proxy for B. Plumlee (GA)
Chris Batsavage, NC, proxy for K. Rawls (AA)
Jerry Mannen, NC (GA)
Bill Gorham, NC, proxy for Rep. Steinberg (LA)
Mel Bell, SC, proxy for P. Maier (AA)
Malcolm Rhodes, SC (GA)
Sen. Ronnie Cromer, SC (LA)
Doug Haymans, GA (AA)
Spud Woodward, GA (GA)
Erika Burgess, FL, proxy for J. McCawley (AA)
Guy DuBeck, NMFS

(AA = Administrative Appointee; GA = Governor Appointee; LA = Legislative Appointee)

Staff

Bob Beal
Toni Kerns
Laura Leach
Lisa Carty
Tina Berger
Kristen Anstead
Maya Drzewicki
Emilie Franke
Chris Jacobs
Jeff Kipp
Savannah Lewis
Kirby Rootes-Murdy
Sarah Murray
Julie Simpson
Caitlin Starks
Deke Tompkins
Geoff White

Guests

Max Appelman, NOAA
Pat Augustine, Coram, NY
Alan Bianchi, NC DENR
Jeff Brust, NJ DEP
Jessica Daher, NJ DEP
Lynn Fegley, MD DNR
James Fletcher, Wanchese Fish Co
Wilson Laney
Chip Lynch, NOAA
Kim McKown, NYS DEC
Conor McManus, RI DEM
Nichola Meserve, MA DMF
Steve Meyers
Pat Moran, MA Env. Police
Allison Murphy, NOAA
Dick Omrod
Cheri Patterson, NH (AA)
Jill Ramsey, VMRC
Tara Scott, NOAA
Melissa Smith, ME DMR
David Stormer, DE DFW
Meredith Whitten, NC DENR
Chris Wright, NOAA
Sarah York, NOAA

These minutes are draft and subject to approval by the Coastal Sharks Management Board.
The Board will review the minutes during its next meeting.

The Coastal Sharks Management Board of the Atlantic States Marine Fisheries Commission convened via webinar; Wednesday, October 20, 2021, and was called to order at 10:30 a.m. by Chair Mel Bell.

CALL TO ORDER

CHAIR MEL BELL: Good morning, everybody, welcome back. This is the Coastal Sharks Management Board. I am Mel Bell, I will be chairing this meeting, and I am an Administrative Proxy for South Carolina, and Chair of the Board now.

APPROVAL OF AGENDA

CHAIR BELL: The first item on the agenda would be Approval of the Agenda. Taking a look at the agenda, are there any modifications necessary to the agenda? Any hands?

MS. TONI KERNS: No hands, Mel.

CHAIR BELL: Okay, seeing no hands, we'll take that as approval of the agenda.

APPROVAL OF PROCEEDINGS

CHAIR BELL: Next item would be Approval of the Proceedings from the February, 2021 meeting of the Coastal Shark Management Board, included in your briefing materials. Are there any corrections or edits necessary to the proceedings from the February, 2021 meeting?

MS. KERNS: I don't see any hands, Mel.

CHAIR BELL: Okay, seeing none, then we'll take that as approval of the proceedings of the February, 2021 meeting.

PUBLIC COMMENT

CHAIR BELL: That takes us to public comment. This would be public comment for anything not on the agenda. Do we have anybody signed up for public comment, Toni, or any hands up?

MS. KERNS: Just going to give everyone a second for hands. We don't have anyone signed up that I'm aware of, and no hands.

SET 2022 SPECIFICATIONS FOR COASTAL SHARKS

CHAIR BELL: All right, good. Well, then we'll just get right into it. Next item would be really our only, well our primary item, which would be to take final action, and this would be to look at the 2022 specifications for the shark fishery provided by National Marine Fishery Service, NOAA Fisheries. They published back in August 2021 the proposed rule, which covers the fishery for 2022. We would need to take a look at that, and take some action on that. I will be turning it over to Kirby to go through that, and then we'll see where we go. Thank you.

MR. KIRBY ROOTES-MURDY: Thank you, Mr. Chair, I have a short presentation for the Board, similar to what you had seen in previous years, so I'll go through that now. Mel covered the first two points. I want to just highlight the background. Just as a reminder, the proposed rule is offering that all shark management groups would open on January 1 of 2022. In terms of, I would say the most important change from previous years, is NOAA Highly Migratory Species Division is proposing a higher retention limit for the large coastal sharks other than sandbars, starting at 55 sharks per vessel per trip, and plan to adjust as needed.

The thinking behind this is that the landings has been well below the quota in recent years, and so to allow for that quota to be better utilized, they are starting at a higher trip limit. On the blacknose shark retention limit, this is going to be status quo from 2021, which is 8 sharks per vessel per trip limit.

I'll get into the next couple slides the quotas, but just so that everyone is aware, these quota levels are status quo from the previous two years, so this year and 2020. Just to summarize for folks, the quota level and the Large Aggregate Coastal Shark's Management Group is 372,552 pounds dressed weight.

For hammerhead sharks it's 59,736 pounds dressed weight. Non-blacknose small coastal sharks is 582,333 pounds dressed weight. For blacknose sharks south 34-degree north latitude it's 37,921 pounds dressed weight, and for the smoothhound dogfish it's 3,973,902 pounds dressed weight. For the Non-Sandbar Large Coastal Shark Research Management Group, the proposed quota is 110,230 pounds dressed weight.

For the Sandbar Shark Research Management Group, it's 199,943 pounds dressed weight. Blue Sharks, 601,856 pounds dressed weight. For Porbeagle Sharks, 3,748 pounds dressed weight, and then for pelagic sharks other than porbeagle or blue sharks it's 1,075,856 pounds dressed weight.

As has been done in previous years, the Board can consider approving the 2022 Coastal Sharks Specifications via e-mail vote after NOAA Fisheries publishes the final rule for the 2022 Atlantic Coastal Shark commercial fishing season. In past years a motion has been made to approve this and following this Board meeting, when that final rule gets published, a staff sends out an e-mail ballot for states to complete. Before we go to any questions, I just wanted to offer Guy DuBeck from NOAAs HMS. All of us wanted to offer any additional comments on the proposed rule.

MR. GUY DuBECK: We are working through the final rule right now, and we're hoping to have that out within the next months, so I think that's all I have about the update about the Final Rule, but as Kirby said, this kind of timing wise is very similar to how we've done it in the past years.

CHIAR BELL: Okay, thank you. Yes, this action is pretty much we just deal with almost as an administrative type thing, barring discussion or issues with what is proposed. At this time, Kirby, would it be best to just go ahead, see if we can get the motion on the table, then discuss and then deal with it?

MR. ROOTES-MURDY: Yes, that would be great.

CHAIR BELL: Okay, I have someone, I think, lined up that would be willing to make the motion.

MS. KERNS: We have Erika Burgess.

CHAIR BELL: All right, Erika.

MS. ERIKA BURGESS: Thank you, Mr. Chair, I move to approve the 2022 Coastal Shark Specifications via an e-mail vote after NOAA Fisheries publishes the Final Rule for the 2022 Atlantic Shark Commercial Fishing Season.

MS. KERNS: We have a second from Doug Haymans.

CHAIR BELL: All right, thanks, Doug. We've got a motion, got a second, any discussion of the motion at this point? Any hands, Toni?

MS. KERNS: I have no hands.

CHAIR BELL: Okay, I guess we have a technical issue. Just for purposes, the motion is actually just that first sentence. There you go. Any discussion?

MS. KERNS: No hands.

CHAIR BELL: Is there any objection to approval of the motion?

MS. KERNS: I see no hands in objection.

CHAIR BELL: All right, thank you, Toni, then the motion passes by unanimous approval.

ELECTION OF VICE-CHAIR

That takes us to our next item on the agenda, which would be election of a Vice-Chair. Do I have nominations?

MS. KERNS: You have a nomination from Spud Woodward.

CHAIR BELL: All right, Spud.

MR. A.G. "SPUD" WOODWARD: Thank you, Mr. Chair, I would nominate Erika Burgess of the Sunshine State to serve as Vice-Chair of the Coastal Sharks Board.

CHAIR BELL: All right, great. Thank you, and I think Erika will be a great choice for that, just given her experience.

MS. KERNS: You have quick hands; Doug Hayman is up for a second again.

CHAIR BELL: Oh good, thank you, Doug, appreciate that. We have a nomination for Erika, a second. Any other nominations for Vice-Chair of Coastal Sharks?

MS. KERNS: No other nominations.

MR. JOHN CLARK: Doug and Spud are from the same state.

MS. KERNS: Oh, thank you, we can't do that, can we? Keep me in track, thanks.

CHAIR BELL: Good call. Do we have a second from another state?

MS. KERNS: Roy Miller.

CHAIR BELL: Okay, Roy, thank you. Definitely not Georgia. All righty, so any objections to the motion to nominate Erika Burgess to serve as Vice-Chair of the Coastal Sharks Board?

MS. KERNS: I see no hands in objection.

CHAIR BELL: All right, well then, that motion passes unanimously. Congratulations, Erika, welcome to the Coastal Sharks Board as the Vice-Chair. Well, that takes us to the last item on the agenda, which is Other Business. Does anybody have any other business to bring before the Coastal Sharks Board at this time? No hands, Toni?

MS. KERNS: No hands, Mel.

ADJOURNMENT

CHAIR BELL: Well, you all are a quiet group. All righty, well then, no other business, we will go ahead and adjourn the Coastal Sharks Management Board.

(Whereupon the meeting adjourned at 10:42 a.m. on October 20, 2021.)

Particulate matter, Reporting and recordkeeping requirements, Sulfur oxides, Volatile organic compounds.

Authority: 42 U.S.C. 7401 *et seq.*

Dated: April 2, 2022.

K.C. Becker,

Regional Administrator, Region 8.

[FR Doc. 2022–07411 Filed 4–8–22; 8:45 am]

BILLING CODE 6560–50–P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 635

[Docket No. 220405–0084]

RIN 0648–BL17

Atlantic Highly Migratory Species; Shortfin Mako Shark Retention Limit

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Proposed rule; request for comments.

SUMMARY: NMFS is proposing to implement a flexible shortfin mako shark retention limit with a default limit of zero in commercial and recreational Atlantic highly migratory species (HMS) fisheries. NMFS proposes to leave the default limit of zero in place unless and until changed. Changes to the retention limit could only be made based on regulatory criteria and only if consistent with an allowable retention determination made by the International Commission for the Conservation of Atlantic Tunas (ICCAT) pursuant to Recommendation 21–09. This action is necessary to implement the binding recommendation of ICCAT adopted in 2021, as authorized under the Atlantic Tunas Convention Act (ATCA), and to achieve domestic management objectives under the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

DATES: Written comments must be received by May 11, 2022. NMFS will hold a public hearing via conference call and webinar for this proposed rule on April 27, 2022, from 2 p.m. to 5 p.m. EDT. For webinar registration information, see the **SUPPLEMENTARY INFORMATION** section of this document.

ADDRESSES: Electronic copies of this proposed rule and supporting documents are available from the HMS Management Division website at *https://www.fisheries.noaa.gov/topic/atlantic-highly-migratory-species.*

You may submit comments on this document, identified by NOAA–NMFS–2022–0015, by electronic submission. Submit all electronic public comments via the Federal e-Rulemaking Portal. Go to *https://www.regulations.gov* and enter ''NOAA–NMFS–2022–0015'' in the Search box. Click on the ''Comment'' icon, complete the required fields, and enter or attach your comments.

Instructions: Comments sent by any other method, to any other address or individual, or received after the close of the comment period, may not be considered by NMFS. All comments received are a part of the public record and will generally be posted for public viewing on *www.regulations.gov* without change. All personal identifying information (*e.g.,* name, address, etc.), confidential business information, or otherwise sensitive information submitted voluntarily by the sender will be publicly accessible. NMFS will accept anonymous comments (enter ''N/A'' in the required fields if you wish to remain anonymous).

FOR FURTHER INFORMATION CONTACT: Carrie Soltanoff (*carrie.soltanoff@noaa.gov*) or Guy DuBeck (*guy.dubeck@noaa.gov*) at 301–427–8503.

SUPPLEMENTARY INFORMATION: North Atlantic shortfin mako sharks are managed primarily under the authority of the Magnuson-Stevens Act (16 U.S.C. 1801 *et seq.*), as well as under ATCA (16 U.S.C. 971 *et seq.*) because they are primarily caught in fisheries for tuna and tuna-like species. Like other Atlantic highly migratory species, North Atlantic shortfin mako sharks are managed under the 2006 Consolidated Atlantic HMS Fishery Management Plan (2006 Consolidated HMS FMP) and its amendments, implemented by regulations at 50 CFR part 635.

NMFS has prepared an Environmental Assessment (EA), Regulatory Impact Review (RIR), and an Initial Regulatory Flexibility Analysis (IRFA), which analyze the anticipated environmental, social, and economic impacts of several alternatives for each of the major issues contained in this proposed rule. A brief summary of the alternatives considered and the background of this proposed rule are provided below. Additional information regarding this rule and overall Atlantic shark management can be found in the draft EA/RIR/IRFA, the 2006 Consolidated HMS FMP and its amendments, the annual HMS Stock Assessment and Fishery Evaluation (SAFE) Reports, and online at *https://www.fisheries.noaa.gov/topic/atlantic-highly-migratory-species.*

A copy of the draft EA/RIR/IRFA prepared for this proposed rule is available from NMFS (see **ADDRESSES**).

Recent ICCAT Shortfin Mako Shark Stock Assessments and Recommendations

The North Atlantic shortfin mako shark (*Isurus oxyrinchus*) is a highly migratory species that ranges across the entire North Atlantic Ocean and is caught by vessels from numerous countries. The stock is predominantly caught in association with fisheries that primarily target tunas and tuna-like species. While these sharks have been a valued component of U.S. recreational and commercial fisheries, U.S. catch represents only a small portion of the species' total catch in the North Atlantic by all reporting countries. International measures are, therefore, critical to effective conservation and management of the species.

In 2017, ICCAT's scientific body, the Standing Committee on Research and Statistics (SCRS), conducted a benchmark stock assessment for North Atlantic shortfin mako sharks. ICCAT accepted the assessment and adopted new management measures for the stock in ICCAT fisheries (Recommendation 17–08). These measures largely focused on maximizing live releases of North Atlantic shortfin mako sharks, allowing retention only in certain limited circumstances, increasing minimum size limits, and improving data collection. Further details are available in Amendment 11 to the 2006 Consolidated HMS FMP (Amendment 11; 84 FR 5358, February 21, 2019). Following the SCRS assessment, NMFS applied domestic stock status determination criteria in 2017 and determined the stock to be overfished and experiencing overfishing.

In 2019, the SCRS completed a North Atlantic shortfin mako shark stock assessment update and provided additional rebuilding information that reflected rebuilding timeframes of two mean generation times (through 2070). Following the update, ICCAT adopted Recommendation 19–06, which maintained the shortfin mako shark management measures in Recommendation 17–08 and called for the development of additional measures in order to establish a rebuilding plan with a high probability of avoiding overfishing and rebuilding the stock to biomass at maximum sustainable yield (B_{MSY}) within a timeframe that takes into account the biology of the stock.

Given that Recommendation 19–06 called for the development of additional measures in order to establish a rebuilding plan, ICCAT at the November

2021 annual meeting adopted additional management measures for North Atlantic shortfin mako sharks in Recommendation 21–09. This recommendation prohibits retention of North Atlantic shortfin mako sharks caught in association with ICCAT fisheries in 2022 and 2023. Limited retention of shortfin mako sharks may be allowed in 2023 and future years if ICCAT determines that fishing mortality is at a low enough level North Atlantic-wide to allow retention consistent with the conservation objectives of the recommendation. The recommendation aims to limit total North Atlantic-wide shortfin mako shark fishing mortality to no more than 250 metric tons (mt), which, the recommendation states, is consistent with the conservation objectives and the 2019 SCRS Kobe matrix, meaning that, at that level of fishing mortality, it is expected that overfishing would not be occurring (fishing mortality rate (F) < F_{MSY}) and the stock would not be overfished (spawning stock fecundity (SSF) > SSF_{MSY}). The SCRS will calculate the annual retention possibility each year based on reported dead discards; live releases; and, where allowed, earlier retention of shortfin mako sharks (with the SCRS providing estimates for any data gaps), and subtracting the amount of that fishing mortality from 250 mt. If applicable, the SCRS will also calculate eligible parties' individual retention allowances each year, based on the overall retention allowance and average annual catches from 2013 through 2016. The recommendation also calls on the SCRS and Panel 4 to test and confirm the appropriateness of the approach for allowing retention. The process and possible retention for 2023 will be discussed at an ICCAT Panel 4 intersessional meeting and at the annual meeting, both in November 2022.

Recommendation 21–09 also includes minimum standards for safe handling and release procedures and enhanced reporting and compliance requirements, which are consistent with existing HMS regulations and do not require additional rulemaking for U.S. implementation. The recommendation calls on the SCRS to continue to prioritize research such as identifying mating, pupping and nursery grounds, and other high concentration areas of North Atlantic shortfin mako sharks, options for spatial-temporal measures, and mitigation measures. By 2024, the SCRS will advise ICCAT on whether size restrictions are effective tools to meet required mortality reductions. Future North Atlantic shortfin mako shark stock assessments are called for in 2024, 2029, and 2034.

Recent U.S. Shortfin Mako Shark Management

Following the adoption of ICCAT Recommendation 17–08 and NMFS' determination that the North Atlantic shortfin mako shark stock is overfished with overfishing occurring, NMFS took action to implement the binding ICCAT recommendation to immediately address overfishing and begin to rebuild the shortfin mako shark stock. NMFS first published an emergency rule in 2018 (83 FR 8946, March 2, 2018; measures extended through March 2019, 83 FR 42452, August 22, 2018) followed by Amendment 11, with a final rule issued in 2019 (84 FR 5358, February 21, 2019), to reduce fishing mortality of shortfin mako sharks in HMS commercial and recreational fisheries. These rules allowed retention only in certain limited circumstances, increased minimum size limits for retention in the recreational fisheries, and improved data collection. In commercial fisheries, Amendment 11 allowed retention of shortfin mako sharks with pelagic longline gear only if the shark is dead at haulback and there is a functional electronic monitoring system on board the vessel, consistent with the ICCAT requirement. Amendment 11 also allowed retention of shortfin mako sharks caught with bottom longline or gillnet gear by persons issued a Directed or Incidental shark limited access permit (LAP) if the shark is dead at haulback, without an electronic monitoring requirement, given the small number of shortfin mako sharks that are caught in those fisheries and NMFS' determination that additional monitoring was not necessary. In recreational fisheries, Amendment 11 implemented an increase in the minimum size limit for the retention of shortfin mako sharks from 54 inches fork length (FL) (137 cm FL) to 71 inches FL (180 cm FL) for male shortfin mako sharks and 83 inches FL (210 cm FL) for female shortfin mako sharks. Amendment 11 also expanded the requirement for the use of circle hooks to all recreational shark fisheries in order to reduce post-release mortality of shortfin mako sharks (the use of circle hooks was already required in recreational shark fisheries south of Chatham, MA, and for all pelagic longline and bottom longline vessels).

At the time of the 2017 shortfin mako shark stock assessment and adoption of Recommendation 17–08, U.S. catches represented approximately 14 percent, on average, of total North Atlantic shortfin mako catch. The measures in the emergency rule and Amendment 11 were successful at reducing overall U.S. shortfin mako shark catch by 90 percent from 2013–2017 average levels, to approximately 3 percent of total North Atlantic shortfin mako shark catch in 2020.

Proposed Measures

In order to meet domestic management objectives, implement Recommendation 21–09, and acknowledge the possibility of future retention, NMFS is proposing to implement a flexible shortfin mako shark retention limit with a default limit of zero in commercial and recreational HMS fisheries. Consistent with current ICCAT provisions, the retention limit would be established as zero until Atlantic-wide catch levels are below 250 mt, a level that has a high probability of ending overfishing and starting to rebuild the stock. ICCAT determined that this measure was needed to bring catch levels down to or below that amount by all ICCAT parties, and thus was an important measure contributing to conservation and management of the stock. The shortfin mako shark retention limit per trip of zero would be in place unless and until changed after consideration of regulatory criteria and consistent with any ICCAT retention allowances pursuant to Recommendation 21–09. The retention limit per trip would apply to commercial vessels issued a Directed or Incidental shark LAP using pelagic longline, bottom longline, or gillnet gear, and to recreational HMS permit holders (those who hold HMS Angling or Charter/Headboat permits, and Atlantic Tunas General category and Swordfish General Commercial permits when participating in a registered HMS tournament). Under the default limit of zero and existing prohibitions for other gear types (see §§ 635.21(a)(4) and 635.24(a)(4)(i) and (iii)), all commercial and recreational fishermen would be required to release all shortfin mako sharks, whether dead or alive at haulback.

During the fishing year, based on consideration of the inseason trip limit adjustment criteria (§ 635.24(a)(8)) and to the extent any future retention is allowable as determined by ICCAT consistent with Recommendation 21–09, NMFS could increase the shortfin mako shark retention limit from the default, or subsequently decrease the retention limit, for the commercial fishery, the recreational fishery, or both. If a retention limit greater than zero is implemented for the commercial fishery, the current commercial shortfin mako shark restrictions would apply,

including allowing retention of shortfin mako sharks caught using only gillnet, bottom longline, or pelagic longline gear on properly-permitted vessels, if the sharks are dead at haulback, and requiring vessels with pelagic longline gear to have a functional electronic monitoring system to retain shortfin mako sharks. Similarly, if a retention limit greater than zero is implemented for the recreational fishery, the current recreational shortfin mako shark restrictions would apply, including minimum size limits of 71 inches FL (180 cm FL) for male and 83 inches FL (210 cm FL) for female shortfin mako sharks. For vessels that hold both a commercial shark permit and a permit with a shark endorsement, the current requirements at §§ 635.22(c)(7) and 635.24(a)(4)(iii) would apply. Vessels that hold such combinations of permits are prohibited from selling shortfin mako sharks, are required to follow the recreational limits, and cannot sell any sharks if retaining shortfin mako sharks. While no upper retention limit is being set in this action, any increase in retention limit would need to be consistent with ICCAT recommendations and could only be implemented after considering the regulatory criteria.

The flexible retention limit as proposed would apply in the HMS bottom longline and gillnet fisheries for sharks, although those fisheries are not considered to be ICCAT fisheries, which are defined as fisheries for tuna or tuna-like species under the current ICCAT Convention. This approach is consistent with the approach taken in Amendment 11, where NMFS determined it was appropriate to implement parallel management measures in the non-ICCAT shark fisheries given that the stock remained overfished with overfishing occurring. This approach would ensure consistency in HMS regulations, which will provide clarity for both the regulated community and for enforcement purposes and thus ensure more effective implementation. NMFS did not, however, implement the ICCAT requirement that electronic monitoring be onboard in these fisheries, because bottom longline and gillnet fisheries have minimal interactions with this species, and electronic monitoring was unnecessary to track such interactions effectively. Under this rule, after considering the measures implemented under Amendment 11 that considered the requirements of the Magnuson-Stevens Act, the status of shortfin mako sharks, and the need for consistency, NMFS is proposing to apply a flexible retention limit with a default of zero to these gears.

Under this proposed rule, research and sampling of shortfin mako sharks would continue to be allowed under exempted fishing permits (EFPs) and scientific research permits (SRPs) (see §§ 635.27(b)(4) and 635.32). Collection of shortfin mako sharks under display permits would not be allowed, and collection of shortfin mako sharks for research under EFPs and/or SRPs would be considered on a case-by-case basis. Collection of shortfin mako sharks under EFPs and/or SRPs could include sampling or limited retention where needed for scientific research. Only non-lethal sampling would be permitted on shortfin mako sharks that are alive at haulback. NMFS intends to limit any EFPs and/or SRPs to closely monitored studies and to limit the number of such permits and the number of sharks that may be sampled and/or retained. In recent years (2018–2021), NMFS has issued eight EFPs and related permits per year on average that include shortfin mako sharks, and zero to one shortfin mako sharks were retained per year under those permits. When retention is otherwise prohibited, any retention pursuant to an EFP and/or SRP would be accounted for under the applicable shark research and display quota. If retention is otherwise permitted consistent with ICCAT recommendations, NMFS would count any retention under EFPs and/or SRPs against the applicable ICCAT retention allowance. Research on shortfin mako sharks is critical to gathering scientific information about the stock and to help ensure that stock assessments have sufficient data. Permitted collection of shortfin mako sharks for scientific research would be consistent with the biological sampling and research needs described in Recommendation 21–09 and other relevant ICCAT recommendations, as well as research needs identified by the SCRS, including to provide data for future shortfin mako shark stock assessments. For example, Recommendations 21–09 and 13–10 provide for collection of biological samples of shortfin mako and other sharks that are dead at haulback during commercial fishing operations by scientific observers or individuals duly permitted by the ICCAT party. If NMFS receives EFP or SRP applications that are outside the scope described in this action, NMFS would provide notice to the public and solicit comments through the annual EFP notice of intent.

NMFS is also proposing a minor modification to the pelagic longline gear restrictions at § 635.21(c)(1)(iv) to further clarify the shortfin mako shark live release requirements.

In addition to the proposed measures, in the EA for this action, NMFS analyzed a no action alternative that would maintain the current commercial and recreational shortfin mako shark regulations as implemented under Amendment 11, and an alternative to place shortfin mako sharks on the prohibited sharks list in the HMS regulations (see §§ 635.24(a)(5), 635.34(c), and Table 1, section D, in appendix A to 50 CFR part 635). The EA for this action describes the impacts of those two alternatives and the preferred alternative proposed here.

Request for Comments

NMFS is requesting comments on this proposed rule which may be submitted via *www.regulations.gov* or at a public conference call/webinar. NMFS solicits comments on this action by May 11, 2022 (see **DATES** and **ADDRESSES**).

During the comment period, NMFS will hold a public hearing via conference call and webinar for this proposed action. Information on the conference call and webinar will be posted at: *https://www.fisheries.noaa.gov/action/proposed-changes-atlantic-shortfin-mako-shark-retention-limits.* Requests for sign language interpretation or other auxiliary aids should be directed to Carrie Soltanoff at *carrie.soltanoff@noaa.gov* or 301–427–8503, at least 7 days prior to the meeting.

The public is reminded that NMFS expects participants at a public webinar to conduct themselves appropriately. At the beginning of the webinar, the moderator will explain how the webinar will be conducted and how and when participants can provide comments. NMFS representative(s) will structure the conference call and webinars so that all members of the public will be able to comment, if they so choose, regardless of the controversial nature of the subject(s). Participants are expected to respect the ground rules, and those that do not may be asked to leave the webinar.

Classification

The NMFS Assistant Administrator has determined that the proposed rule is consistent with the 2006 Consolidated HMS FMP and its amendments, other provisions of the Magnuson-Stevens Act, ATCA, and other applicable law, subject to further consideration after public comment.

This proposed rule has been determined to be not significant for purposes of Executive Order 12866.

This proposed rule contains no information collection requirements under the Paperwork Reduction Act of 1995.

An IRFA was prepared, as required by section 603 of the Regulatory Flexibility Act (RFA). The IRFA describes the economic impact this proposed rule, if adopted, would have on small entities. A description of the action, why it is being considered, and the legal basis for this action are contained at the beginning of this section in the preamble and in the **SUMMARY** section of the preamble. A summary of the analysis follows. A copy of this analysis is available from NMFS (see **ADDRESSES**).

Section 603(b)(1) requires agencies to describe the reasons why the action is being considered. In compliance with section 603(b)(1) of the RFA, the purpose of this proposed rulemaking is, consistent with the 2006 Consolidated HMS FMP objectives, the Magnuson-Stevens Act, ATCA, and other applicable law, to analyze the impacts of the alternatives for implementing the ICCAT-recommended limit on retention of North Atlantic shortfin mako sharks.

Section 603(b)(2) of the RFA requires agencies to state the objectives of, and legal basis for, the proposed action. In compliance with section 603(b)(2) of the RFA, the objective of this proposed rulemaking is to implement ICCAT recommendation consistent with ATCA and achieve domestic management objectives under the Magnuson-Stevens Act.

Section 603(b)(3) of the RFA requires agencies to provide an estimate of the number of small entities to which the rule would apply. NMFS established a small business size standard of $11 million in annual gross receipts for all businesses in the commercial fishing industry (NAICS 11411) for RFA compliance purposes. The Small Business Administration (SBA) has established size standards for all other major industry sectors in the United States, including the scenic and sightseeing transportation (water) sector (NAICS code 487210), which includes for-hire (charter/party boat) fishing entities. The SBA has defined a small entity under the scenic and sightseeing transportation (water) sector as one with average annual receipts (revenue) of less than $8.0 million.

NMFS considers all HMS permit holders, both commercial and for-hire, to be small entities because they had average annual receipts of less than their respective sector's standard of $11 million and $8 million. Regarding those entities that would be directly affected by the proposed measures, the average annual revenue per active pelagic longline vessel is estimated to be $202,000, based on approximately 90 active vessels that produced an estimated $18.2 million in revenue in 2020, well below the NMFS small business size standard for commercial fishing businesses of $11 million. No single pelagic longline vessel has exceeded $11 million in revenue in recent years. Other non-longline HMS commercial fishing vessels typically earn less revenue than pelagic longline vessels and, thus, would also be considered small entities.

The proposed rule would apply to the 213 Shark Directed LAP holders, 256 Shark Incidental LAP holders, and 4,055 HMS Charter/Headboat permit holders, based on 2021 data. Of those HMS Charter/Headboat permit holders, 3,021 obtained shark endorsements. In 2018 and 2019, 800 HMS for-hire trips targeting shortfin mako sharks were taken per year on average (7 percent on average of total HMS for-hire trips), from Maine to Virginia as captured in Large Pelagics Survey data. These trips were taken by, on average, 10 percent of HMS for-hire charter/headboat vessels. On average, there were 44 Atlantic HMS tournaments that targeted pelagic sharks (primarily shortfin mako sharks) in 2018 through 2021. There were approximately 1,555 directed shortfin mako shark trips in registered HMS tournaments on average in 2018 through 2021. On average, 26 federally-permitted dealers per year purchased shortfin mako sharks in 2018 through 2020. NMFS has determined that the preferred alternative would not likely directly affect any small organizations or small government jurisdictions defined under RFA, nor would there be disproportionate economic impacts between large and small entities.

Section 603(b)(4) of the RFA requires agencies to describe any new reporting, record-keeping, and other compliance requirements. This proposed rule does not contain any new collection of information, reporting, or record-keeping requirements.

Under section 603(b)(5) of the RFA, agencies must identify, to the extent practicable, relevant Federal rules which duplicate, overlap, or conflict with the proposed action. Fishermen, dealers, and managers in these fisheries must comply with a number of international agreements, domestic laws, and other fishery management measures. These include, but are not limited to, the Magnuson-Stevens Act, ATCA, the High Seas Fishing Compliance Act, the Marine Mammal Protection Act, the Endangered Species Act, the National Environmental Policy Act, the Paperwork Reduction Act, and the Coastal Zone Management Act. This proposed action has been determined not to duplicate, overlap, or conflict with any Federal rules.

Under section 603(c) of the RFA, agencies must describe any significant alternatives to the proposed rule which accomplish the stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities. Specifically, the RFA (5 U.S.C. 603(c)(1)–(4)) lists four general categories of significant alternatives to assist an agency in the development of significant alternatives. These categories of alternatives are: (1) Establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities; (2) clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities; (3) use of performance rather than design standards; and, (4) exemptions from coverage of the rule, or any part thereof, for small entities.

NMFS examined each of these categories of alternatives. Regarding the first, second, and fourth categories, NMFS cannot establish differing compliance or reporting requirements for small entities or exempt small entities from coverage of the rule or parts of it because all of the businesses impacted by this rule are considered small entities and thus the requirements are already designed for small entities. NMFS does not know of any performance or design standards that would satisfy the aforementioned objectives of this rulemaking while, concurrently, complying with the Magnuson-Stevens Act. As described below, NMFS analyzed several different alternatives in this proposed rulemaking, and provides rationales for identifying the preferred alternative to achieve the desired objectives.

The alternatives considered and analyzed are described below. The IRFA assumes that each vessel will have similar catch and gross revenues to show the relative impact of the proposed action on vessels.

Alternative 1, the no action alternative, would not implement any new management measures in the commercial or for-hire shark fisheries to decrease mortality of shortfin mako sharks. In recent years, about 49,000 pounds dressed weight (dw) (22,000 kilograms dw) of shortfin mako sharks have been landed commercially on average from 2018 through 2020 and the commercial revenues from shortfin mako sharks have averaged

approximately $96,000 per year. The number of pounds of shortfin mako shark landed, revenue, and number of pelagic longline vessels that landed shortfin mako sharks was lower in 2020 compared to 2018 and 2019 (average landings in 2018 and 2019 were 55,700 pounds dw (25,000 kilograms dw), average revenue was approximately $109,600 per year, and average number of pelagic longline vessels landing shortfin mako sharks was 53). Almost all of the shortfin mako shark commercial landings, based on dealer reports, were made by pelagic longline vessels. An average of 49 pelagic longline vessels landed shortfin mako sharks from 2018 through 2020. Therefore, the average annual revenue from shortfin mako shark landings per pelagic longline vessel is approximately $1,960 per year ($96,000/49) under the current regulations. For-hire shark fishing operations by HMS Charter/Headboat permit holders as well as HMS tournament operations would also remain the same. This alternative would result in no additional economic impacts on small entities associated with these fisheries in the short- or long-term.

Alternative 2, the preferred alternative, would implement a flexible shortfin mako shark retention limit with a default limit of zero. The limit of zero would be in place unless and until changed after considering inseason trip limit adjustment criteria (§ 635.24(a)(8)) and when consistent with ICCAT retention allowances pursuant to Recommendation 21–09. This would apply to commercial vessels issued a Directed or Incidental shark LAP and to HMS Charter/Headboat permit holders. Under a retention limit of zero, HMS for-hire fishermen and commercial vessels would be required to release all shortfin mako sharks that are alive at haulback and discard all shortfin mako sharks that are dead at haulback. In recent years, about 49,000 pounds dw (22,000 kilograms dw) of shortfin mako sharks have been landed commercially on average from 2018 through 2020, and the commercial revenues from shortfin mako sharks have averaged approximately $96,000 fishery-wide per year. Almost all of the shortfin mako shark commercial landings, based on dealer reports, were made by pelagic longline vessels. An average of 49 pelagic longline vessels landed shortfin mako sharks from 2018 through 2020. Therefore, the average loss in annual revenue from shortfin mako shark landings per pelagic longline vessel that landed shortfin mako sharks would be approximately $1,960 per year ($96,000/49). However, the overall economic impacts associated with these reductions in revenue are not expected to be substantial, as shortfin mako sharks comprise less than one percent of total HMS ex-vessel revenues on average. Additionally, the magnitude of shortfin mako landings by other commercial gear types (bottom longline and gillnet) is very small. This alternative would have minor economic costs on small entities in those commercial fisheries compared to the no action alternative because these measures would reduce the number of shortfin mako sharks landed and sold by these fishing vessels. Shortfin mako sharks are rarely a target species, however, and generate much less revenue overall than other more valuable target species. In for-hire fisheries and tournaments, retention would be prohibited, and fishermen would only be authorized to catch and release shortfin mako sharks. A retention limit of zero for shortfin mako sharks is likely to be a disincentive to fishing by some portion of the for-hire shark fishery, particularly those individuals that would otherwise have planned to target and retain shortfin mako sharks. Charter/headboat operators may experience some decline in demand if shortfin mako sharks may not be retained, resulting in minor adverse economic impacts. For Atlantic HMS tournaments, the 1,555 directed shortfin mako shark trips, on average, that take place in HMS tournaments would likely no longer take place, resulting in a loss of approximately $1.1 million in expenditures, out of an estimated $85.6 million in total HMS tournament expenditures by participating teams. Overall, this alternative would have minor economic costs on small entities in the short-term compared to the no action alternative.

During the fishing year, based on the inseason trip limit adjustment criteria (§ 635.24(a)(8)), and to the extent consistent with any future retention allowance that is determined by ICCAT pursuant to Recommendation 21–09, NMFS could increase the shortfin mako shark retention limit for the commercial fishery, the recreational fishery, or both, as appropriate. If the retention limit for the commercial and recreational fisheries is greater than zero, the current shortfin mako shark regulatory requirements, described under Alternative 1, would apply. This would result in no additional economic impacts on small entities associated with this fishery in the long-term compared to the no action alternative.

Alternative 3 would place shortfin mako on the prohibited sharks list to prohibit any catch or retention of shortfin mako sharks in commercial and recreational HMS fisheries. *See* Table 1, section D, in appendix A to 50 CFR part 635 (prohibited sharks list), § 635.24(a)(5) (related vessel restrictions), and § 635.34(c) (criteria for adding species to, or removing species from, the prohibited shark species group). The overall economic impacts associated with reductions in revenue for the commercial and for-hire fisheries and HMS tournaments would be similar to those described under Alternative 2 and are not expected to be substantial, as shortfin mako sharks comprise less than one percent of total HMS ex-vessel revenues on average. This alternative would have minor economic costs on small entities in commercial fisheries because no shortfin mako sharks would be landed and sold by these fishing vessels under these measures. Shortfin mako sharks are rarely a target species, however, and generate less revenue overall than other more valuable target species. In for-hire fisheries and tournaments, retention would be prohibited, and fishermen would only be authorized to catch and release shortfin mako sharks. A prohibition on the retention of shortfin mako sharks is likely to be a disincentive for some portion of the for-hire shark fishery, particularly those individuals that would otherwise have planned to target and retain shortfin mako sharks. Charter/headboat operators may experience some decline in demand, resulting in adverse economic impacts. For Atlantic HMS tournaments, the 1,555 directed shortfin mako shark trips, on average, that take place in HMS tournaments would likely no longer take place, resulting in a loss of approximately $1.1 million in expenditures, out of an estimated $85.6 million in total HMS tournament expenditures by participating teams. Overall, Alternative 3 would have minor economic costs on small entities in the short- and long-term.

List of Subjects in 50 CFR Part 635

Fisheries, Fishing, Fishing vessels, Foreign relations, Imports, Penalties, Reporting and recordkeeping requirements, Statistics, Treaties.

Dated: April 5, 2022.

Carrie Robinson,

Acting Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

For the reasons set out in the preamble, 50 CFR part 635 is proposed to be amended as follows:

PART 635—ATLANTIC HIGHLY MIGRATORY SPECIES

■ 1. The authority citation for part 635 continues to read as follows:

Authority: 16 U.S.C. 971 *et seq.;* 16 U.S.C. 1801 *et seq.*

■ 2. In § 635.20, revise paragraph (e)(6) to read as follows:

§ 635.20 Size limits.

* * * * *

(e) * * *

(6) For shortfin mako sharks landed when the recreational retention limit specified at § 635.22(c)(8) is greater than zero, males must be at least 71 inches (180 cm) fork length, and females must be at least 83 inches (210 cm) fork length.

* * * * *

■ 3. In § 635.21, revise paragraph (c)(1)(iv) to read as follows:

§ 635.21 Gear operation and deployment restrictions.

* * * * *

(c) * * *

(1) * * *

(iv) Has pelagic longline gear on board, persons aboard that vessel are required to promptly release in a manner that causes the least harm any shortfin mako shark that is alive at the time of haulback, consistent with the requirements specified at paragraphs (a)(1) and (c)(6)(i) of this section. When the commercial retention limit specified at § 635.24(a)(4)(v) is greater than zero, any shortfin mako shark that is dead at the time of haulback may be retained provided the electronic monitoring system is installed and functioning in compliance with the requirements at § 635.9.

* * * * *

■ 4. In § 635.22, revise paragraph (c)(2) and add paragraph (c)(8) to read as follows:

§ 635.22 Recreational retention limits.

* * * * *

(c) * * *

(2) Only one shark from the following list may be retained per vessel per trip, subject to the size limits described in § 635.20(e)(2) and (4): Atlantic blacktip, Gulf of Mexico blacktip, bull, great hammerhead, scalloped hammerhead, smooth hammerhead, lemon, nurse, spinner, tiger, blue, common thresher, oceanic whitetip, porbeagle, Atlantic sharpnose, finetooth, Atlantic blacknose, Gulf of Mexico blacknose, and bonnethead.

* * * * *

(8) At the start of each fishing year, the default shortfin mako shark retention limit of zero sharks per vessel per trip will apply. During the fishing year, NMFS may adjust the default shortfin mako shark trip limit per the inseason trip limit adjustment criteria listed in § 635.24(a)(8). Any retention within the trip limit is subject to the size limits described in § 635.20(e)(6).

* * * * *

■ 5. In § 635.24:

■ a. Add a heading for paragraph (a)(4);

■ b. Revise paragraphs (a)(4)(i) and (iii);

■ c. Add paragraph (a)(4)(v);

■ d. Revise paragraphs (a)(8)(v) and (vi); and

■ e. Add paragraph (a)(8)(vii).

The additions and revisions read as follows:

§ 635.24 Commercial retention limits for sharks, swordfish, and BAYS tunas.

* * * * *

(a) * * *

(4) *Additional retention limits for sharks.* (i) Except as provided in § 635.22(c)(7), a person who owns or operates a vessel that has been issued a directed shark LAP may retain, possess, land, or sell pelagic sharks if the pelagic shark fishery is open per §§ 635.27 and 635.28. Shortfin mako sharks may be retained by persons aboard vessels using pelagic longline, bottom longline, or gillnet gear only if NMFS has adjusted the commercial retention limit above zero pursuant to paragraph (a)(4)(v) of this section and only if the shark is dead at the time of haulback and consistent with the provisions of §§ 635.21(c)(1), (d)(5), and (g)(6) and 635.22(c)(7).

* * * * *

(iii) Consistent with paragraph (a)(4)(ii) of this section, a person who owns or operates a vessel that has been issued an incidental shark LAP may retain, possess, land, or sell no more than 16 SCS and pelagic sharks, combined, per vessel per trip, if the respective fishery is open per §§ 635.27 and 635.28. Of those 16 SCS and pelagic sharks per vessel per trip, no more than 8 shall be blacknose sharks. Shortfin mako sharks may only be retained under the commercial retention limits by persons using pelagic longline, bottom longline, or gillnet gear only if NMFS has adjusted the commercial retention limit above zero pursuant to paragraph (a)(4)(v) of this section and only if the shark is dead at the time of haulback and consistent with the provisions at § 635.21(c)(1), (d)(5), and (g)(6). If the vessel has also been issued a permit with a shark endorsement and retains a shortfin mako shark, recreational retention limits apply to all sharks retained and none may be sold, per § 635.22(c)(7).

* * * * *

(v) At the start of each fishing year, the default shortfin mako shark retention limit of zero sharks will apply. During the fishing year, NMFS may adjust the default shortfin mako shark trip limit per the inseason trip limit adjustment criteria listed in paragraph (a)(8) of this section.

* * * * *

(8) * * *

(v) Variations in seasonal distribution, abundance, or migratory patterns of the relevant shark species based on scientific and fishery-based knowledge;

(vi) Effects of catch rates in one part of a region or sub-region precluding vessels in another part of that region or sub-region from having a reasonable opportunity to harvest a portion of the relevant quota; and/or

(vii) Any shark retention allowance set by ICCAT, the amount of remaining allowance, and the expected or reported catch rates of the relevant shark species, based on dealer and other harvest reports.

* * * * *

■ 6. In § 635.27, revise paragraph (b)(4)(i) and add paragraph (b)(4)(v) to read as follows:

§ 635.27 Quotas.

* * * * *

(b) * * *

(4) * * *

(i) The base annual quota for persons who collect LCS other than sandbar, SCS, pelagic sharks other than shortfin mako, blue sharks, porbeagle sharks, or prohibited species under a display permit or EFP is 57.2 mt ww (41.2 mt dw).

* * * * *

(v) No persons may collect shortfin mako sharks under a display permit. Collection of shortfin mako sharks for research under EFPs and/or scientific research permits (SRPs) may be considered on a case-by-case basis and any associated mortality would be deducted from the shark research and display quota if shortfin mako shark retention is otherwise prohibited or counted against U.S. allowable retention levels established at ICCAT when retention is allowed.

* * * * *

[FR Doc. 2022–07659 Filed 4–8–22; 8:45 am]

BILLING CODE 3510–22–P

Atlantic States Marine Fisheries Commission

Atlantic Striped Bass Management Board

May 4, 2022
11:30 a.m. – 5:15 p.m.
Hybrid Meeting

Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary.

1.	Welcome/Call to Order *(M. Gary)*	11:30 a.m.
2.	Board Consent • Approval of Agenda • Approval of Proceedings from January 2022	11:30 a.m.
3.	Public Comment	11:35 a.m.
4.	Draft Amendment 7 for Final Approval **Final Action** (includes 1 hour lunch break) • Review Options and Public Comment Summary *(E. Franke)* • Advisory Panel Report *(E. Franke)* • Law Enforcement Committee Report *(K. Blanchard)* • Consider Final Approval of Draft Amendment 7	11:45 a.m.
5.	Review 2022 Stock Assessment Update Projection Scenarios *(K. Drew)*	4:20 p.m.
6.	Consider Next Steps for Draft Addendum VII to Amendment 6 **Possible Action** *Motion from October 2021: Move to defer until May 2022 consideration by the Atlantic Striped Bass Board of Draft Addendum VII to Amendment 6 to allow further development and review of the transfer options.*	4:35 p.m.
7.	Review and Populate Advisory Panel Membership *(T. Berger)* **Action**	5:05 p.m.
8.	Elect Vice-Chair *(M. Gary)* **Action**	5:10 p.m.
9.	Other Business/Adjourn	5:15 p.m.

The meeting will be held at The Westin Crystal City (1800 Richmond Highway, Arlington, VA; 703.486.1111) and via webinar; click here for details

MEETING OVERVIEW

Atlantic Striped Bass Management Board
May 4, 2022
11:30 a.m. – 5:15 p.m.
Hybrid

Chair: Marty Gary (PRFC) Assumed Chairmanship: 01/22	Technical Committee Chair: Vacant	Law Enforcement Committee Rep: Kurt Blanchard (RI)
Vice Chair: Vacant	Advisory Panel Chair: Louis Bassano (NJ)	Previous Board Meeting: January 26, 2022
Voting Members: ME, NH, MA, RI, CT, NY, NJ, PA, DE, MD, DC, PRFC, VA, NC, NMFS, USFWS (16 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from January 2022

3. Public Comment – At the beginning of the meeting, public comment will be taken on items not on the agenda. Individuals that wish to speak at this time must sign-in at the beginning of the meeting. For agenda items that have already gone out for public hearing and/or have had a public comment period that has closed, the Board Chair may determine that additional public comment will not provide additional information. In this circumstance, the Chair will not allow additional public comment on an issue. For agenda items that the public has not had a chance to provide input, the Board Chair may allow limited opportunity for comment. The Board Chair has the discretion to limit the number of speakers and/or the length of each comment.

4. Draft Amendment 7 (11:45 a.m.-4:20 p.m.) Final Action
(includes 1 hour lunch break)

Background

- The status and understanding of the striped bass stock and fishery has changed considerably since implementation of Amendment 6 in 2003, which has raised concerns that the existing management program may no longer reflect current fishery needs and priorities.
- Accordingly, the Board initiated development of Draft Amendment 7 to consider addressing a number of important issues facing striped bass management and build upon the Addendum VI action to end overfishing and initiate rebuilding.
- In January 2022, the Board approved for public comment Draft Amendment 7 with proposed options addressing four issues: management triggers, recreational release mortality, rebuilding plan, and conservation equivalency.
- Twelve public hearings were conducted in March **(Briefing Materials)** and written comments were accepted through April 15 **(Supplemental Materials)**.
- The Advisory Panel reviewed Draft Amendment 7 in April 2022 **(Supplemental Materials)**.

Presentations

- Overview of options and public comment summary by E. Franke
- Advisory Panel Report by E. Franke; Law Enforcement Committee Report by K. Blanchard

Board actions for consideration at this meeting

- Select management options and implementation dates.
- Approve final document.

5. Review 2022 Stock Assessment Update Projection Scenarios (4:20-4:35 p.m.)

Background

- The 2022 stock assessment update for Atlantic striped bass will be conducted in Summer 2022 with results expected in October 2022.
- The assessment update will provide stock projections including calculating the level of fishing mortality necessary to rebuild the stock by 2029 under a specified recruitment assumption. The recruitment assumption is considered in Draft Amendment 7.

Presentations

- Overview of projection scenarios by K. Drew

Board guidance for consideration at this meeting

- Board guidance is needed on the probability scenarios for the rebuilding projections (percent chance of achieving rebuilding).

6. Draft Addendum VII to Amendment 6 (4:35-5:05 p.m.) Possible Action

Background

- In May 2021, the motion to include the commercial quota allocation issue in Draft Amendment 7 failed for lack of a majority. Many Board members recognized that Delaware has raised this issue for some time and Delaware has been asking for a more equitable allocation. In addition there were some individuals that expressed an interest in reviewing more recent data to consider in the allocations.
- In August 2021, concurrent with the development of Draft Amendment 7, the Board initiated Draft Addendum VII to Amendment 6 to consider allowing the voluntary transfer of commercial striped bass quota between jurisdictions that have commercial quota.
- In September 2021, the PDT discussed Draft Addendum VII to Amendment 6 **(Briefing Materials)**.
- Due to the PDT's concerns and the Board's focus on Draft Amendment 7, in October 2021, the Board deferred consideration of Draft Addendum VII until May 2022 to allow further development and review of the transfer options.

Presentations

- Overview of Draft Addendum VII to Amendment 6 by E. Franke

Board Actions for Consideration

- Consider next steps for Draft Addendum VII to Amendment 6.

7. Advisory Panel Membership (5:05-5:10 p.m.) Action
Background • There is one new nomination to the Atlantic Striped Bass Advisory Panel—Jamie Lane, a commercial gillnetter from North Carolina **(Briefing Materials)**.
Presentations • Nomination by T. Berger
Board actions for consideration at this meeting • Approve Atlantic Striped Bass Advisory Panel nomination.

8. Elect Vice Chair (5:10-5:15 p.m.) Action
Background • The vice chair seat is empty since Marty Gary (PRFC) has become the new chair.
Board actions for consideration at this meeting • Elect Vice Chair

9. Other Business/Adjourn (5:15 p.m.)

Atlantic Striped Bass

Activity level: High

Committee Overlap Score: Medium (TC/SAS/TSC overlaps with BERP, Atlantic menhaden, American eel, horseshoe crab, shad/river herring)

Committee Task List

- PDT – develop all documentation for the development of Draft Amendment 7
- SAS/TC – Conducting the 2022 stock assessment update
- TC – June 15th: Annual compliance reports due

TC Members: Kevin Sullivan (NH), Caitlin Craig (NY), Nicole Lengyel Costa (RI), Alexei Sharov (MD), Charlton Godwin (NC), Ellen Cosby (PRFC), Brooke Lowman (VA), Gail Wippelhauser (ME), Gary Nelson (MA), Brendan Harrison (NJ), Jeremy McCargo (NC), Kurt Gottschall (CT), Margaret Conroy (DE), Luke Lyon (DC), Tyler Grabowski (PA), Peter Schuhmann (UNCW), Tony Wood (NMFS), Steve Minkkinen (USFWS), John Ellis (USFWS), Katie Drew (ASMFC), Emilie Franke (ASMFC)

SAS Members: Michael Celestino (NJ, Chair), Gary Nelson (MA), Alexei Sharov (MD), Hank Liao (VMRC), John Sweka (USFWS), Margaret Conroy (DE), Katie Drew (ASMFC), Emilie Franke (ASMFC)

PDT Members: Nichola Meserve (MA), Nicole Lengyel Costa (RI), Brendan Harrison (NJ), Simon Brown (MD), Max Appelman (NMFS), Greg Wojcik (CT), Emilie Franke (ASMFC)

Tagging Subcommittee (TSC) Members: Stuart Welsh (WVU, Chair), Angela Giuliano (MD), Beth Versak (MD), Brendan Harrison (NJ), Chris Bonzek (VIMS), Gary Nelson (MA), Ian Park (DE), Jessica Best (NY), Josh Newhard (USFWS), Katie Drew (ASMFC), Emilie Franke (ASMFC)

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

ATLANTIC STRIPED BASS MANAGEMENT BOARD

Webinar
January 26, 2022

These minutes are draft and subject to approval by the Atlantic Striped Bass Management Board.
The Board will review the minutes during its next meeting.

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ATTENDANCE

Board Members

Megan Ware, ME, proxy for P. Keliher (AA)
Sen. David Miramant, ME (LA)
Cheri Patterson, NH (AA)
Ritchie White, NH (GA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)
Mike Armstrong, MA, proxy for Dan McKiernan (AA)
Raymond Kane, MA (GA)
Sarah Ferrara, MA, proxy for Rep. Sarah Peake (LA)
Jason McNamee (AA)
David Borden, RI (GA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
Justin Davis, CT (AA)
Bill Hyatt, CT (GA)
Jesse Hornstein, NY, proxy for J. Gilmore (AA)
Emerson Hasbrouck, NY (GA)
John McMurray, NY, proxy for Sen. Kaminsky (LA)
Joe Cimino, NJ (AA)
Tom Fote, NJ (GA)
Kris Kuhn, PA, proxy for T. Schaeffer (AA)
Loren Lustig, PA (GA)
G. Warren Elliott, PA (LA)
John Clark, DE (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Mike Luisi, MD, proxy for B. Anderson (AA)
Russell Dize, MD (GA)
David Sikorski, MD, proxy for Del. Stein (LA)
Pat Geer, VA, Administrative proxy
Bryan Plumlee, VA (GA)
Shanna Madsen, VA, proxy for Sen. Mason (LA)
Chris Batsavage, NC, proxy for K. Rawls (AA)
Jerry Mannen, NC (GA)
Bill Gorham, NC proxy for Rep. Steinberg (LA)
Marty Gary, PRFC
Dan Ryan, DC, proxy for J. Seltzer
Max Appelman, NMFS
Mike Millard, USFWS

(AA = Administrative Appointee; GA = Governor Appointee; LA = Legislative Appointee)

Ex-Officio Members

Kevin Sullivan, Technical Committee Chair
Mike Celestino, Stock Assmnt Subcommittee Chair
Kurt Blanchard, Law Enforcement Representative

Staff

Bob Beal
Toni Kerns
Laura Leach
Tina Berger
Pat Campfield
Lisa Carty
Kristen Anstead
James Boyle
Katie Drew
Maya Drzewicki
Emilie Franke
Lisa Havel
Chris Jacobs
Jeff Kipp
Sarah Murray
Caitlin Starks
Deke Tompkins

Guests

Dave Anderson
Jerry Audet
Pat Augustine, Coram, NY
Jason Avila, Avila Global
Matt Ayer, MA DMF
Duncan Barnes
Megan Barrow, NYS DEC
Mel Bell, SC (AA)
Rick Bellavance
John Bello
Peter Benoit, Ofc. Sen. King, ME
Josh Bergan
Alan Berger
Jessica Best, NYS DEC
Alan Bianchi, NC DENR

Guests (continued)

Andrea Bolduc, MA House
Christopher Borgatti
Jason Boucher, NOAA
Peter Bravo
Andrew Briggs
Matt Broderick
Simon Brown, MD DNR
Jeff Brust, NJ DEP
George Bucci
Erika Burgess, FL FWS
Tony Butch
Jonathan Cabrera
Chris Campo
Bruce Caporale
Chris Cassel
Patrick Cassidy
Bryan Choquette
Matthew Cieri, ME DMR
Peter Clark, NJ DEP
Germain Cloutier
Josh Cohn
Allison Golden, CBF
Margaret Conroy, DE DFW
Margaret Conroy, DE DFW
John Contello
Colleen Coogan, NOAA
Michael Cook
Brian Coombs
Joe Coppola
Heather Corbett, NJ DEP
Nicole Lengyel Costa, RI DEM
Nathan Cowen
Jack Creighton
Greg Cudnik
Rip Cunningham
Jessica Daher, NJ DEP
Bob Danielson
Rachel Dean
Dominic De Flumeri
Louis Defonten
Laura Deighan, NOAA
Greg DiDomenico
Lawrence Di Donato
Evan Dintaman
Steve Doctor, MD DNR
Chris Dollar
Timothy Donnelly
Carl Dulay
Mark Eustis, Grey Owl Analytic
Peter Fallon, Maine Stripers
Jimmy Fee
Lynn Fegley, MD DNR
Cynthia Ferrio, NOAA
Kenneth Fletcher, CBF
Julien Frank
Sewell Frey
Anthony Friedrich, SGA
Tom Fuda
Lorena de la Garza, NC DENR
John Gans, TRCP
Jeffrey Gearhart, NOAA
Paul Genovese, MD DNR
Lewis Gillingham, VMRC
Angela Giuliano, MD DNR
Willy Goldsmith
Frank Goncalves
James Goodhart
Jesse Gordon, RCN
Kurt Gottschall, CT DEEP
Tyler Grabowski, PA F&B
Jake Hardy
Cynthia Harkness
Brenden Harrison, NJ DEP
Eric Harrison
Andrew Hayes
James Henne, US FWS
Helen Takade Heumacher, EDF
Rebecca Heuss, NH FGD
Jaclyn Higgins, TRCP
Carle Hildreth
Nicholas Hill
Peter Himchak, Cooke Aqua
Rich Hittinger
Scott Hoffer, SAPPI
Carol Hoffman, NYS DEC
Joe Holbeche, U Mass
Jacob Holtz, MD DNR
Jeffrey Horne, MD DNR
Harry Hornick, MD DNR
Chris Horton
Edward Houde
Tom Hughes
Bob Humphrey
Jim Hutchinson
Taylor Ingraham
Stephen Jackson, FL FWS
Peter Jenkins
Blaise Jenner, ME DMR
James Jewkes
Gerald Jones
Michael Kapareiko
TJ Karbowski
Kurt Karwacky
Pat Keliher, ME (AA)
Brian Kendall
Carrie Kennedy, MD DNR
Greg Kennedy, NYS DEC
Adam Kenyon, VMRC
Ross Kessler, MA DMF
Rich King
Thomas Kosinski
Richard Kuhlman
Aaron Landry
Wilson Laney
Brandon Lansing
Nils Larson
Peter Leary
Kyle Lewis
Ole Leyva
Carl Lobue, TNC
Nick Lombardi
Brooke Lowman, VMRC
Dee Lupton, NC DENR
Chip Lynch, NOAA
Pam Lyons, Wild Oceans
Edward Maley
Christian Martin
Frank Masseria
Genine McClair, MD DNR
Tara McClintock, Cornell
Dan McKiernan, MA (AA)
Conor McManus, RI DEM
Kevin McMenamin
Frank Meisel
Jeff Mercer, RI DEM

Guests (continued)

Nichola Meserve, MA DMF
Steve Meyers
Steve Minkkinen, FL FWS
Pete Mohl
Remy Moncrieffe, Audobon
Chris Moore, CBF
Brian Neilan, NJ DEP
Brandon Muffley, MAFMC
Allison Murphy, NOAA
Khoa Nguyen
Adam Nowalsky
Callan Noone
George O'Donnell, MD DNR
Zane Oliver
Christian Olla
Derek Orner
Alexi Papadopoulo
Patrick Paquette
Ian Park, DE DFW
Alexis Park, MD DNR
Justin Pellegrino, NYS DEC
Dave Peros
Patrick Perrotto
Wes Phillips
Anthony Pizzella
Kelly Place
Michael Plaia
Nick Popoff, FL FWS
Mike Porta, PA F& B
Will Poston, SGA
Brian Potvin
Nick Prawer
Hunter Priebe
Evan Priovolos
Michael Quinlan
Jill Ramsey, VMRC
Thomas Rapone
Kathy Rawls, NC (AA)
Andrew Reichardt, Flyfishers Intl.
Paul Risi, KBCC, NYC
Matthew Risser
Patrick Rudman
Courtney Roberts
Lenny Rudow
Tony Sarcona
David Secor, UMD CES
Alexei Sharov, MD DNR
Phillip Sheffield
Matthew Shoultz
Harold Smith
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Dave Surdel
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George Sylvestre
Colin Temple
Lane Thurgood
Luis Tirado
Michael Toole
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Jim Uphoff, MD DNR
Chris Uraneck, ME DMR
Peter Vandergrift
Taylor Vavra, Stripers Forever
Thomas Ventrone
Beth Versak, MD DNR
Mike Waine, ASA
Arek Zenel-Walasek
Michael Walp
Craig Weedon, MD DNR
Peter Wenczel
Greg Wenz
Ben Whalley
Peter Whelan
Zachary Whitener, GMRI
Lowell Whitney, US FWS
Kate Wilke, TNC
Angel Willey, MD DNR
John Page Williams
Logan Williams
Roxanne Willmer
Charles Witek
Steven Witthuhn
West Wolfe, *The Leader*
Michael Woods
Spud Woodward, GA (GA)
Chris Wright, NOAA
John Wu
Harvey Yenkinson
Phil Zalesak
Christopher Zikowitz
Jordan Zimmerman, DE DFW
Erik Zlokovitz, MD DNR
Renee Zobel, NH FGD

The Atlantic Striped Bass Management Board of the Atlantic States Marine Fisheries Commission convened via webinar; Wednesday, January 26, 2022, and was called to order at 1:30 p.m. by Chair Martin Gary.

CALL TO ORDER

CHAIR MARTIN GARY: I would like to call to order the Atlantic States Marine Fisheries Commission Winter, 2022, Striped Bass Management Board. Today, well first of all for those of you who don't know me, my name is Marty Gary, I'm from the Potomac River Fisheries Commission. I'm the incoming Chair, this will be my first meeting.

Previously David Borden served through October of last year. Our Vice-Chair is currently vacant. We'll be addressing that vacancy at the May board meeting. Our Technical Committee Chair is Kevin Sullivan, from New Hampshire. Our Advisory Panel Chair is Lou Bassano from New Jersey. Our Law Enforcement Committee representative is Kurt Blanchard from Rhode Island. Previously this Board met on October 20, 2021.

First order of business is to go to, and actually, before we do that. I want to take a moment to provide some gratitude and thanks to the outgoing Chair, David Borden. David served through October of this past year, 2021, and had to navigate a labyrinth of meetings, and the logistics associated with them, the work group that met in the summer of 2020. It was a tremendous amount of work. David, we just want to thank you for your leadership, and all your hard work that went into that, so thank you very much.

MR. DAVID V. BORDEN: Yes, thanks.

CHAIR GARY: You're welcome, David, it's great work. You have gotten us tantalizingly close with this Amendment, so hopefully we'll be able to get that through at this meeting, and then out to public comment. The public has been very patient waiting for this. One other item I wanted to hit.

We have a dynamic Board, it changes a lot, and there is one name that I'm not familiar with. Maybe it's a mistake, but Jesse Hornstein. Jesse, I don't think I've met you personally, but maybe somebody else has already welcomed you through the other boards, but welcome to the Striped Bass Board. As I understand, you are the Administrative Proxy for James Gilmore, so welcome, Jesse.

MR. JESSE HORNSTEIN: Thank you.

APPROVAL OF AGENDA

CHAIR GARY: All right, so we'll go ahead and move into the agenda. The first order of business is Approval of the Agenda. Are there any changes, modifications to the agenda as it's been presented today?

MS. TONI KERNS: I have no hands, Marty.

APPROVAL OF PROCEEDINGS

CHAIR GARY: Thank you, Toni, and so the agenda is approved by consent. Next up is the Approval of the Proceedings from October, 2021. Are there any modifications to the last meeting of this Board in October, 2021?

MS. KERNS: I have no hands.

CHAIR GARY: That approval of those proceedings; it's also approved through consent.

PUBLIC COMMENT

CHAIR GARY: Next up, Number 3 on our agenda is Public Comment. This is for issues that are not on our agenda today. I would ask those individuals that would like to make comment for these items that aren't part of our agenda, if they could raise their hand now, and Toni, if you could just let me know how many we have, so we can budget time appropriately.

MS. KERNS: I'm just giving it a second to let hands get up. Phil, I see that your hand is up, but you are not connected to the audio, so I can't unmute you. Hopefully you got the message about who you can

call to help get you connected. I don't know what else to do there, Marty. Not the only hand we have.

CHAIR GARY: Okay, well I'm hoping that if there are other items that Phil would like to comment on. It is my intention, if there are any modifications to the items that are being presented today that we'll be getting to fairly shortly. Whether it's an addition, a deletion or a modification, probably an opportunity, so that maybe there is a way Mr. Zalesak can still provide his thoughts.

All right, so the only other item I want to discuss, before we go into the next item, which is Consider Draft Amendment 7 for Public Comment, is my status as Chair. I think most of you know that PRFC does not have a delegation. I'm the sole representative for the Agency. As such, I'm going to be voting today.

I did discuss this with Bob and Toni, and so that is discretion that I have and I can exercise. It is my intention. I just want to go on the record as saying, I will be voting for PRFC today. With that, we'll go to Item Number 4, Consideration of Draft Amendment y for Public Comment. I'll turn it over to Emilie.

But I'll just let everybody know, our primary objective today is to take the document, and for those items that Emilie is going to be presenting, our mission here today, our objective is to, we can either leave items in the document, we can remove them, we can modify them, or we could add something. It would be my intention to, time permitting, provide the public comment, if any modification, addition or deletion were to occur. Emilie, I'll turn it over to you and we'll start this Item Number 4, Consider Draft Amendment 7 for Public Comment.

CONSIDER DRAFT AMENDMENT 7 FOR PUBLIC COMMENT

MS. EMILIE FRANKE: I'll go ahead and get this presentation started. Again, thanks so much, Mr. Chair. As you mentioned, I will be presenting an overview of striped bass Draft Amendment 7 today for the Board's consideration. Here is just an outline of the presentation today. I'll start with a brief background on the Amendment and the timeline, and then I'll transition to reviewing the proposed options, with a focus today on the new options that have been added or modified since the October board meeting.

Those new options are in the management trigger section, the measures to protect strong year classes section, and the rebuilding plan section. Then throughout the presentation today I'll note comments from the Advisory Panel on those new options, and then I'll conclude today with reviewing the remaining options in the recreational release mortality and the conservation equivalency sections.

Then as part of that recreational release mortality review, I'll also review some discussion from the Law Enforcement Committee from their winter webinar. Then finally, similar to the previous board meeting in October, I'll pause for Board questions and discussions after one or two sections, and as Marty mentioned, the Board action for consideration today is to consider approval of Draft Amendment 7 for public comment.

First, I would like to thank the Plan Development Team for their time developing this draft document, and working through all these options. We've had several more meetings since the October board meeting, so again I want to thank them for their time. I also want to thank the Technical Committee for providing the projections for the year class section that I'll review during this presentation.

Starting with a brief recap of the background on Amendment 7. Since Amendment 6 was adopted in 2003, the status of the striped bass stock and fishery has changed considerably. The results of the 2018 benchmark stock assessment in particular, led the Board to discuss a number of issues facing striped bass management.

That assessment indicated that the stock has been overfished since 2013, and is experiencing overfishing. In August of 2020, the Board initiated

the development of Amendment 7, to update the management program to better align with current fishery priorities, and to build on the Addendum VI action to initiate stock rebuilding.

In May of last year, following the public comment period on the public information document, or PID. The Board approved four issues for development in the draft amendment, and those issues are Management Triggers, Measures to Protect the 2015 Year Class, which was initially focused on the ocean recreational fishery, Recreational Release Mortality and Conservation Equivalency.

At the October, 2021 Board meeting, the Board did discuss Draft Amendment 7 and the proposed options that were presented, and the Board decided to remove some of the draft options, due to concerns about viability for implementation. Those removed options are no longer in the Draft Amendment that was provided to you for review today. Also at the October meeting, the Board tasked the Plan Development Team with developing additional options to add to the draft, for the Board to review today at the winter meeting. Those additional options that have been added were an additional option for the fishing mortality threshold trigger, options to consider low recruitment in the rebuilding calculations and rebuilding plan, and then options for Chesapeake Bay recreational measures, to protect strong year classes. Since the October board meeting, as I mentioned, the Plan Development Team has met via webinar several times to develop these new options.

In addition to the new options, the PDT Has also modified some of the other options in the Draft Amendment, and those modifications were explained in the memo from the PDT that was included in the meeting materials. Then finally, the PDT also updated the Amendment with clarifying edits as needed throughout the draft.

Here is the current timeline for Amendment 7. As I mentioned, following the PID process, which wrapped up in May, the PDT has been developing the Draft Amendment, based on direction from the Board, including the changes made by the Board at the October, 2021 meeting. Currently, we are here in January, 2022 for the Board to consider approving the Draft Amendment for public comment.

If the draft is approved for public comment today, the public comment period would take place from February through April, and the final Amendment could be approved potentially in May of this year. As a reminder, the next stock assessment update is expected later this year in October. Just a couple of reminders on implementation timeline for Amendment 7.

The implementation timeline will be determined by the Board during final approval of the Draft Amendment. This includes setting a deadline for states to submit implementation plans, and a deadline for implementation, and those will be specified in Section 5.2, which is the compliance schedule.

Draft Amendment 7, as we all know, includes options for several different provisions, which could have different implementation timelines. For example, any new management measures that would require states to change their regulations, so for example, measures to address recreational release mortality would likely be implemented in 2023, to allow time to make those regulatory changes.

On the other hand, management triggers are typically implemented immediately upon approval of the Amendment. Those new triggers would be evaluated during the 2022 assessment update later this year. The Board could specify a different implementation timeline if needed for the management triggers, for example, if any state's regulations were tied to those triggers.

Listed here on the side are an outline of the components of the draft amendment document, Section 1 includes Statement of the Problem, Benefits of Implementation, Habitat Considerations. Section 2 includes the History of Management, Goals and Objectives, Description of the

Management Unit, Reference Points, and Stock Rebuilding Program.

Section 3 of the Amendment specifies monitoring program information, including catch and landings data, biological data, and also an overview of the stock assessment process. Section 4 is the Management Program and Proposed Options section, which includes all the proposed options that I'll be reviewing today. Those are options for Management Triggers, Recreational Measures, the Rebuilding Plan, and Conservation Equivalency. Section 4 does also include the Adaptive Management section. Then continuing on, Section 5 is the Compliance Section, and that includes all the mandatory Compliance Elements, and outlines the Compliance Reports and those procedures.

Section 6 describes Management and Research Needs, and Section 7 reviews Potential Interactions with Protected Species. For the rest of my presentation today, I'll transition to reviewing the proposed options in the Draft Amendment. Again, starting with those new options that have been added since the October board meeting.

I'll start with Management Triggers, followed by Measures to Protect Strong Year Classes, and the Rebuilding Plan section. Then as I mentioned, I'll wrap up with the Recreational Release Mortality and Conservation Equivalency section. I'll pause after one or two sections for questions or discussion from the Board, and then as Mr. Chair mentioned earlier, just as a reminder, today the Board could modify the proposed options if desired, and the Board could consider approving this Draft Amendment for public comment.

Throughout my presentation, I had mentioned I'll be including the Advisory Panel comments. The Advisory Panel met in January, to provide feedback on the scope of the new proposed options that were added since October. I'll include those comments throughout my slides today. The full AP summary was included in the supplemental materials for the meeting.

In addition, the Law Enforcement Committee met via webinar in December, and briefly discussed the proposed options to address recreational release mortality, and their input will also be included in my presentation today. Moving into the proposed options, the first section for review is Section 4.1, which is the management triggers.

The statement of the problem for this issue outlines some of the concerns with how the current management triggers are designed. Those concerns include that when spawning stock biomass is below the target, the variable nature of fishing mortality from year to year can result in a continued need for management action.

In addition, the shorter timetables for corrective action, as required through the triggers, are in conflict with the Board's desire for management stability. The Board has also been criticized for considering changes to management, before the stock has had a chance to respond to previous management changes.

The use of point estimates for management triggers does not account for an inherent level of uncertainty, and that was identified as a potential concern. Then finally, the long periods of below average recruitment in recent years have raised questions about the recruitment trigger. The PDT divided the trigger options into four tiers.

The first tier outlines the fishing mortality trigger options. The second tier outlines the female spawning stock biomass trigger options, the third tier outlines the recruitment trigger options, and the fourth-tier outlines options for deferred management action. Within each tier is a set of primary options and sub-options to consider, and this framework is designed to allow the Board and the public to consider each of the triggers individually. One note from staff is that language will be added to the Draft Amendment noting that during stock assessment years the recruitment trigger should be evaluated concurrently, when possible, with the fishing mortality and spawning stock biomass triggers, at the time the assessment results are presented.

For example, stock assessment updates are typically presented to the Board at the annual meeting in October. During those assessment years the Board would evaluate the recruitment trigger at the October meeting as well. This would ensure that the Board has the best available information on the stock, when evaluating all the triggers.

Staff does recognize that evaluating the recruitment trigger at the same time as the fishing mortality and spawning stock biomass triggers, may not always be possible during benchmark assessment years. The timing of benchmark assessments can be variable, but when it is possible, all the triggers should be evaluated at the same time during stock assessment years.

Moving into Tier 1, which are the fishing mortality triggers. The first set of options is Option A, the timeline to reduce fishing mortality to the target. When one of the fishing mortality triggers is tripped, Sub-Option A1 would require reducing F to the target within one year. That is the status quo. Sub-Option A2 would require reducing F to the target within two years.

Option B is the fishing mortality threshold trigger. If this trigger is tripped, the Board must reduce F to the target per the timeline selected in the options that I just described in Option A. B1 is the status quo option, where the trigger is tripped if F exceeds the threshold for one year. Sub-Option B2 is a new option that was added by the Board based on the October board meeting that would trip if the two-year average of F exceeds the F threshold.

Then Sub-Option B3, the trigger would be tripped if the three-year average of F exceeds the threshold. As I mentioned, at the October meeting the Board discussed the concern about averaging F rates from different management actions. The PDT clarified in the Draft Amendment that for these multiyear average trigger options, Sub-Options B2 and B3, the average should not include data under different management actions.

The trigger would not be evaluated, unless there are enough years of data to average under the most recent management action. For example, the stock assessment this year will include two years of data under Addendum VI. Those two years of fishing mortality could be averaged under Sub-Option B2.

However, if Sub-Option B3 was selected, that trigger could not be evaluated, because there wouldn't be three years of data available to evaluate. From the Advisory Panel perspective, some AP members did support considering these multiyear average options during the public comment period, to address some concerns about uncertainty around MRIP and variability of F.

Another AP member noted concern about the multiyear average options, and concern about having to wait two or three years for enough data, before taking action to reduce F. Moving on to Option C. This is the fishing mortality target trigger. If this trigger is tripped, the Board must reduce F to the target, again per the timeline selected in Option A. C1 is the status quo option, where the trigger trips if F exceeds the target for two years, and if spawning stock biomass is below the target in either year. C2 would trip if F exceeds the target for three consecutive years, and C3 would eliminate the trigger related to F target.

Moving on to Tier 2, which are the female spawning stock biomass triggers. Again, there are three sets of options for the Board to consider. Option A considers the deadline to implement a rebuilding plan when a spawning stock biomass trigger is tripped, which requires rebuilding within ten years.

The status quo option, A1 is no deadline for when a rebuilding plan must be implemented. A2 would require the Board to implement a rebuilding plan within two years from when that trigger is tripped. Continuing on to Option B, which is the spawning stock biomass threshold trigger. B1 is the status quo option, where the trigger is tripped if SSB is less than the threshold for one year.

Sub-Option B2 would eliminate that trigger related to the spawning stock biomass threshold. Option C is the spawning stock biomass target trigger. C1 is the status quo option, where the trigger trips if SSB

is less than the target for two consecutive years, and if F is above the target in either year.

C2 would trip if SSB is below the target for three consecutive years, and then C3 would eliminate a trigger related to the SSB target. Again, it's important to note that there must be at least one SSB trigger, so the Board could not eliminate both the SSB target and the SSB threshold triggers.

Moving on to Tier 3, which is the recruitment trigger. The first component to consider for the recruitment trigger is the definition of the trigger itself. The status-quo trigger A1 was designed to identify true recruitment failure, and this trigger would trip if any of the six juvenile abundance indices are below the 25th percentile of their established reference period for three consecutive years.

As requested by the Board, the recruitment trigger alternatives, developed by the Technical Committee, Options A2 and A3 here, would be more sensitive than the status quo trigger. These Sub-Options A2 and A3 would change the trigger reference period to 1992 to 2006. This was identified as a period of high recruitment, and this results in more sensitive trigger options.

Sub-Option A2 would have a moderate sensitivity, and that would trip if any of the four core juvenile abundance indices, and so those are the four juvenile abundance indices that are used in the stock assessment, are below the 25th percentile, from 1992 to 2006 for three consecutive years. Sub-Option A3 would have a higher sensitivity, and would trip if any of the four core juvenile abundance indices is below the median from 1992-2006 for three consecutive years.

Again, there is that hierarchy of the status quo moving to the moderate sensitivity and then the higher sensitivity options. The second component of the recruitment trigger is the management response. The status quo option B1 requires the Board to review the cause of recruitment failure, and determine the appropriate action if the trigger is tripped. For the alternatives here, the PDT removed a previous alternative that would have initiated stock rebuilding. After further discussion after the October board meeting, the PDT noted that stock rebuilding is a more appropriate response to the SSB triggers, and not to the recruitment trigger.

In addition to that modification, the PDT did modify Sub-Options B2 and B3, which are both intended to reduce fishing pressure as those weak year classes enter the population. Both Sub-Options B2 and B3 are based on calculating interim F reference points, using a low recruitment assumption. However, these sub-options are slightly different in determining when action would be required to reduce F.

The PDT noted in the memo for today that the PDT recommends the Board consider whether one of the approaches that I'll present on the next slide, B2 or B3, if one of those best aligns with what the Board was intending for this recruitment trigger response. Starting with B2 on the left here, B2 would implement an interim F target, calculated using the low recruitment assumption, if the recruitment trigger is tripped.

Then F in the terminal year would be compared to that lower F target, and if F in the terminal year is less than that interim F target, the Board would need to reduce F within one year. On the right side, Sub-Option B3 would similarly use a low recruitment assumption to calculate an interim F target, and would also calculate an interim F threshold.

Then here is where these two options diverge. B3 would use those lower interim F reference points to reevaluate the fishing mortality triggers, using those lower F reference points. This option would go back to the definitions of the triggers that the Board selected under Tier 1, and plug in those new lower F target and F threshold.

If one of those F based triggers tripped during this reevaluation, then the Board would be required to reduce F. The difference here is a little bit subtle, but B2, which evaluates one point estimate of F

against the target, is more conservative than B3, which uses the already defined triggers from Tier 1.

Again, if the Board has any discussion on which of these approaches best aligns with the Board's intent here, it might be helpful to consider. Then to wrap up this section, the final tier, Tier 4 is the deferred management action section. Option A is the status quo option, which is no deferred management action.

That is, if a management trigger is tripped at any time, the Board must take the required action. The alternatives presented here would provide the Board with the flexibility to defer action until the next stock assessment, if certain criteria are met. These options again were developed in response to the concern about the frequent need to make management changes.

Option B would allow action to be deferred until the next assessment, if it's been less than three years since the last action was taken responding to a management trigger. Option C would defer action until the next assessment, if the F target trigger is tripped and SSB is above the target. Option D would defer action until the next assessment, if the F target trigger is tripped, and SSB is projected to increase or remain stable over the next five years. Option E would defer action if the F target trigger is tripped and there is at least a 75 percent probability that SSB will be above the threshold for the next five years. That is looking at the probability of SSB being above the threshold in that fifth year.

Previously this Option E required at least a 50 percent probability, but the PDT modified this option to require at least a 75 percent probability, in order to increase the level of confidence when the Board is considering differing action. Then finally, Option F would defer action until the next assessment, if a management trigger trips after the Board has already initiated action in response to a different trigger. Mr. Chair, that's all I Have for management triggers, and I'm happy to take any questions, or provide any more detail, if needed.

CHAIR GARY: Thank you, Emilie, and as we decided up front, we're going to go through these sequentially, so thanks for the presentation on the management triggers. We're now going to take questions from the Board for Emilie, regarding any clarification you need. Then we're going to move into a discussion, and consider any potential modification, removal or additions. Questions for Emilie, and I'll rely on Toni if you could. I'm not a presenter, so if you could go ahead and maintain the queue for questions, please.

MS. KERNS: Will do, Marty, thank you, Mr. Chair. John McMurray is the only person with a hand up for now.

CHAIR GARY: All right, John.

MR. JOHN G. McMURRAY: I have a question regarding the F threshold trigger Sub-Option B3, which is the three-year average option. Particularly the sub text below B3, which says, the three-year average F should not include data under different management actions, i.e., the F threshold trigger should not be evaluated unless there are at least three years of data in the assessment under the most recent management action.

Based on the frequency of assessments, which is generally every two years, and it's rarely more than that, and subsequent management actions that take place. This would appear to me to effectively limit the years of data available, and there would almost never be a time when there are at least three years of data in the assessment under the most recent management action. Am I interpreting that option right, because it seems really unlikely that a threshold would ever be tripped under that option?

MS. FRANKE: You are interpreting that correctly, in that the trigger couldn't be evaluated under Option B3, unless there were three years of data available under the most recent management action. The PDT wanted to provide the Board with this range of average options.

Again, considering an average threshold trigger here would be a way for the Board to address concerns about variability. One of the things that as also noted in the Amendment, which I did not note on the slide, is that the Board isn't constrained by taking action only if the trigger trips. The Board could take action at any time. But you are interpreting that correctly.

MR. McMURRAY: Follow up, Mr. Chair.

CHAIR GARY: Yes, go ahead, John, all yours.

MR. McMURRAY: Theoretically overfishing could continue, but because of the frequency of assessments, no management action would be required, correct?

MS. FRANKE: Correct, if there are less than three years of data available, then the trigger couldn't be evaluated.

MR. McMURRAY: Okay, one more quick one, and then I'll cut it off if I can, Mr. Chairman. I haven't been around as long as a lot of you guys here, but has there ever been a time since Amendment 6 was implemented that the Board did act without a management trigger being tripped?

MS. FRANKE: Good question, I'm going to defer maybe to Toni, or to potentially other Board members on this one.

MS. KERNS: I'm going to defer that to Bob, since he's been around since the approval of Amendment 6.

EXECUTIVE DIRECTOR ROBERT E. BEAL: I guess the buck stopped here, Marty, if I can chime in.

CHAIR GARY: Absolutely, Bob, please do.

EXECUTIVE DIRECTOR BEAL: John, I'm not sure. I would have to go back and look. I know that the Board has reacted a number of times to stock assessment information. But I don't know if each time, you know a management trigger was tripped when the Board reacted, or if just the stock condition changed, but did not trip one of the triggers. I would have to go back and look, I just don't recall, sorry.

CHAIR GARY: John, did that answer your, well it didn't answer your question, I guess. But it sounds like we would have to get back to you on it. Does that satisfy the range of questions you had for Emilie and staff?

MR. McMURRAY: It does.

CHAIR GARY: Okay, thank you. Toni, has anybody else raised their hand?

MS. KERNS: Yes, we have Mike Luisi, followed by Justin Davis.

CHAIR GARY: All right, Mike, you're up.

MR. MICHAEL LUISI: Emilie, I just had a quick question for you, related to a comparison of, let me see which tiers here. It's comparison of the Tier 1 options, with the Tier 4 options under deferred management. Under Tier 1 there is an Option C for F target triggers. I'm not suggesting in any way that this would be the case. But if an F target trigger, if it was determined by the Board that there was going to be more of a focus on threshold and less on an F target trigger under the Tier 1 alternatives.

Does it eliminate Options C, D, and E in the deferred management action, since they are all related to the F target trigger, or is there an opportunity then for that to default to what's selected from Tier 1, of which trigger we would be using for fishing mortality. Does that make sense? Yes, I hope that makes sense, I know I was jumping back and forth. I just want to be sure what I need to explain this to folks. If F target goes away, do we lose the options to defer management?

MS. FRANKE: Yes, I understand your question, and that's a great question. The PDT did not talk about this scenario specifically, so that we also did not talk about if it did, if the F target trigger was eliminated if C, D, and E would change. I'm going to say that if

the F target trigger is eliminated, C, D, And E would no longer be available as options.

MR. LUISI: Thanks, Emilie, thanks Mr. Chairman, that's all I had.

CHAIR GARY: Toni, did you say Justin was next in queue?

MS. KERNS: Correct.

CHAIR GARY: Dr. Davis, it's all yours.

DR. JUSTIN DAVIS: I would like to return to the Sub-Option B3 under the F management trigger response, and I appreciate John bringing that up, because I have the same concerns about whether this trigger would essentially be too conservative, and wouldn't be tripped very often. I guess the idea that we would never have three years of data under consistent management, sort of presumes that we would make a management change every time we get an assessment.

But if I'm interpreting this correct. If the Board received an assessment, and decided not to take management action, either because the assessment results were very positive or a management trigger wasn't tripped. That would set the stage for, at the next assessment, us being able to have at least three years of data under consistent management, and therefore being able to evaluate this F trigger B3. I'm wondering if I'm interpreting that correct.

Then the second question I have was if the Board has the flexibility to request a stock assessment update, sort of sooner than perhaps planned, outside of the normal kind of stock assessment rotation we typically do for this species. If there was an instance where we received a stock assessment, there were a couple troubling years of F, but we didn't have the three years under consistent management required. The Board would have the latitude to request an update sooner than planned, to allow sooner evaluation of that F trigger. Is that correct?

MS. FRANKE: Correct, so you are interpreting that correctly, in that if an addendum were in place for a couple years, and then another assessment comes along, and the Board decides not to change management, but rather to maintain management under that addendum. Then at the next stock assessment, as you noted, there would be more than three years available for the Board to consider with this potential B3 trigger. As you mentioned, yes, the Board can request a stock assessment at any time.

DR. DAVIS: Mr. Chair, could I ask a quick follow up?

CHAIR GARY: Sure, Justin.

DR. DAVIS: The guidance about if Sub-Option B3 were selected, that that management trigger should only be evaluated if there are three years of data under consistent management. That's a PDT recommendation? I mean would it be possible, when the Board take final action on this, if the Board so chose, we could adopt Option B3, but remove that sort of limiter that it has to be three years of data under the most recent action?

Just my thought there is, I get the rationale for three years under consistent management, but on some level, F is F. If we took a look after the assessment and had three years of F exceeding the threshold, even if that first year was under different management. Perhaps it still would be appropriate to take action. I mean could we potentially not put that guardrail in when the Board takes final action, if we selected this sub-option?

MS. FRANKE: Yes, the Board could make that change to remove that guardrail, and that would mean that F is averaged for three years, regardless of whether those three years were under the same management action. From the PDTs perspective, you know the PDTs intent was not to average F under different management actions, but the Board could make a decision to change that.

CHAIR GARY: Does that answer your question, Justin?

DR. DAVIS: Yes, thank you, Emilie.

CHAIR GARY: Toni, any other hands raised for questions?

MS. KERNS: Those are all the hands for now, Marty.

CHAIR GARY: It sounds like we've gone through the question-and-answer component for this section. Is there a discussion about any modification? It sounds like there is an interest. Complexity level here is pretty high. There are some concerns, we're all sensing. Does anyone want to go ahead and initiate a discussion? Go ahead and raise your hands, Toni will queue it again, to see if we want to take any action to modify, remove any of these items.

MS. KERNS: I have Megan Ware, followed by John McMurray.

CHAIR GARY: All right, Megan.

MS. MEGAN WARE: Well, I think along those lines of other people's concern about Sub-Option B3 in Tier 1. I would be open to a discussion about removing that option, and I sent staff a motion, in case you would like to offer it via motion today.

CHAIR GARY: Let me come back to you, but I'll reserve you first right to go ahead and make that motion. Did you have a follow to that or anything you wanted to add?

MS. WARE: Well, I think a lot of what has been said I would agree with, and just the practicality of that option I think is pretty limited. Looking forward, I'm not sure I see a time in the next decade where we might meet that three-year mark. Obviously, if we're going to be taking action in 2022 on an Amendment, we would postpone the discussion on commercial allocation. We may need to take action to meet rebuilding. I'm just not seeing a lot of value in that trigger in the next decade.

CHAIR GARY: Thank you, and we'll go to John McMurray.

MR. McMURRAY: I think Megan was going to make the same motion that I was, so I will let her do that.

CHAIR GARY: Toni, do we have any other hands raised for discussion on this?

MS. KERNS: We have Tom Fote.

MR. THOMAS P. FOTE: I didn't want to chime in before, but I remember when we basically made changes in regulations not based on triggers, but other things, and that's going back a long time that we've done that. We've gone through the document a lot. I'm ready to go out to public hearings, and I really don't have strong feelings any one of them. I don't feel that strongly about B3 to take it out.

I just want to have it go out to public hearing and find out what the public feels on a lot of these issues. We've been looking at them for two years now. I think it's time just to send it out to the public and let them look at it, and make a decision without us starting to remove a bunch of things, because we could be here all night. If you picayune again, like we've been doing for the last three sessions. I would like to get this out for public hearings.

CHAIR GARY: Any others, Toni?

MS. KERNS: No other hands, Marty.

CHAIR GARY: All right, Megan, I'll bring it back to you then. Do you want to go help them see out the motion, and staff could go ahead and capture that? Then we'll need a second.

MS. WARE: Reading it into the record. Move to remove in Section 4.1: Management Triggers, Sub-Option B3 in Tier 1: Fishing Mortality Management Triggers (three-year average F exceeds the F threshold) from Draft Amendment 7.

CHAIR GARY: Thank you, Megan, do we have a second? I think we might.

MS. KERNS: John McMurray.

CHAIR GARY: Thank you, John. All right, so we have a motion and we had a second, and Megan, I'll come back. Is there anything more you want to add to your rationale for the motion? Then I'll come to John, then we'll open it up for discussion to the Board.

MS. WARE: I think my rationale has been provided, so I'm all set, thank you.

CHAIR GARY: John, did you want to add anything, or we can go to discussion.

MR. McMURRAY: No, thank you, I think I made my concerns pretty clear.

CHAIR GARY: All right, thank you both. We'll open this up, we have a motion on the floor, and we'll go to discussion, and as I said previously, we will go to the public before we bring this back to the Board for a vote. The floor is open, raise any hands for comments, discussion on the motion.

MS. KERNS: I just have one hand, Chris Batsavage, oh two hands, Chris and Justin Davis.

CHAIR GARY: All right, Chris, you have the floor.

MR. CHRIS BATSAVAGE: I support the motion for the reasons given and the concerns given. I think you know again; it's not going to be likely to hit this threshold, with the timing of things. On its face it's already a little on the risky side, waiting for three years average F exceeding the threshold.

In terms of going out to the public. Due to the unlikeliness of hitting this, I think it would probably be better to take it out of the Amendment now, so the public can focus on the many other options that we will need feedback on, as opposed to this one. That seems a little problematic.

CHAIR GARY: Over to you, Justin.

DR. DAVIS: I'm a bit torn on this. I can appreciate the rationale provided by Megan and John, and I appreciate Chris's comments. The thing about Sub-Option B3 that appeals to me, is allowing us to use three years of data, a three-year average of F, which I think provides us the best ability to sort of eliminate the undue influence of one potentially sort of outlier year allows us to incorporate the most amount of information, and smooth out the estimate of F as much as possible.

Then again, I do have these concerns that this trigger may ultimately be too conservative as constructed, and not be tripped often enough. I think as I mentioned in my earlier comments, there may be ways for the Board to either amend this sub-option, were we to decide this was the one we want to ultimately adopt and/or potentially adjust future stock assessment schedules to potentially ameliorate that issue of the trigger not being tripped often enough. I guess I'm looking at this through the lens of, does this need to come out now, before it goes it goes to public comment. We're not taking final action right now, and I think right now I'm leaning towards leaving it in. Although I do agree that as constructed it could be problematic, and might need further consideration, if this is the sub-option we ultimately decided to adopt at final action.

CHAIR GARY: Toni, any other Board members wish to comment on this? You have three hands, Justin Davis, Max Appelman, and Mike Luisi.

CHAIR GARY: I think Justin just spoke, so Max, you're up.

MR. MAX APPELMAN: Yes, I think I'm with Justin on this right now. Given where we are in the process, we're talking about a scoping document. I think I would rather keep this in, because I see a tradeoff between Options B2 and B3 right now. On the one hand, the more years of data you used in this trigger definition, the better handle we're getting on where true F is under that management action, right? Speaking to the point of smoothing out that variability in F from year to year.

But on the other hand, the more years you're required to use, the more years, I guess you have to wait, until you can evaluate that trigger. I just think that if the intent here is about addressing that

variability in F, then having two options for the public to weigh in on, is going to help us evaluate what's more important, how many years we need to wait between evaluating this trigger, or how many years of data we're using to try to find that true F value. I think I'm in favor of keeping this in the document for public comment.

CHAIR GARY: Over to Mike Luisi.

MR. LUISI: I have a question related to what Max just ended up with in his statement, which was looking at this option as some way a delay in taking action. I do agree with Justin and Max that if we can use three years of F, and obtain the average from a longer time series. In my mind that's better than two years.

But maybe my question is more for Emilie. It's going to take a little while, obviously, until we have three years of information after this Amendment is finalized, to use in this evaluation. Is there a way that we can, I'm struggling with the question? Is there a delay? I'm trying to figure out where the delay is if this option stays in, and we use it in the Amendment for final action.

Because we already have fishing mortality, and we're going to get a new estimate of fishing mortality. All we're doing then is suggesting that we go back and use three years of fishing mortality, in order to determine whether or not a trigger is tripped. Where is the delay? If you can help me understand that. I think the public is not going to be happy with a delay, and I certainly understand that. But I'm trying to figure out where the delay that everyone is speaking of comes into play here.

CHAIR GARY: Emilie, are you or other staff able to address Mike's question?

MS. FRANKE: Absolutely. The delay would come in, because with requiring three years in order to evaluate the trigger. Then overfishing could be occurring for two years, but the Board would be delayed in taking action, potentially to address that overfishing, because that action wouldn't be required until you have that third year of data. That is the concept of the delay, in that F could be over the threshold for one or two years, but the Board wouldn't be required to take action until there are three years of data available, so that is sort of where the delay concept comes in, in terms of being delayed in addressing overfishing.

MR. LUISI: Okay, Mr. Chairman, if I could just follow up. If I understand that correctly, it's three new years of information that would be required, in order to trip this trigger, rather than the time series that has already been established, and just using three years, or the most recent three year's average.

I can understand it if it's three new years of fishing mortality, and if that's the case then I can't go forward with this motion, but I can support the motion to get rid of it, because I think three years is too long to wait. I just thought there was another way around it that we could still use three years in the average, but not have to wait three years to get the data to do that averaging. That's all, thank you.

CHAIR GARY: Toni, anyone else with any more discussion?

MS. KERNS: Two more hands, Ritchie White followed by Tom Fote.

CHAIR GARY: All right, Ritchie, you have the floor.

MR. G. RITCHIE WHITE: Yes, I support the motion. I think Mike Luisi just made the strong argument to do away with this. This is exactly what the public doesn't want to see us do. The public wants to see us act faster, not slower, so strongly support it, thank you.

CHAIR GARY: Tom Fote.

MR. FOTE: The more I think about this the more I realize how many times we've actually acted, and then basically two years changed our mind, because of retrospective analysis. I think this doesn't stop us that we start seeing things in two years that started it in motion, but the third year that we basically seeing it then we confirm.

It doesn't stop you from doing it. It doesn't have to be new information. You have two years of information, because it's happening, you're asking for one more year to make sure, because we've changed. I know New Jersey had to change regulations three times, because they said we had to do this, because this is what it showed. Then it came back two years later, no, you have to go back to the other regulations, because we weren't overfishing.

I'm always concerned when we do knee jerk reactions going one way or the other, whether it's conservative or liberalized. We should have the same rules for both of them. But it doesn't stop us from acting if we see this one-year pattern, then two years pattern, we can start whatever we need to do, and if the third year confirms it, then we basically act. That's the way I'm reading it, maybe I'm wrong. If I'm wrong, please answer my question.

CHAIR GARY: I do want to give the public a chance to comment if they would like to. Are there any other Board members that would like to offer comments?

MS. KERNS: Mike Armstrong.

CHAIR GARY: All right, Mike, you have the last word, and then we're going to go to the public.

DR. MICHAEL ARMSTRONG: I guess I'm a little confused. I don't think these have to be new data we're using, right? Say two years from now we do an assessment, and it shows four years back we had been exceeding it. Because these Fs change a little bit. There is a retrospective pattern, it's not bad in the assessment, but they do change.

It's conceivable we can turn the crank on an assessment in two years, and have data going back more than two years that we can use. If I'm reading that right, it doesn't have to be new data, Emilie, correct? I mean if the assessment says we've been overfishing for three years, then we can use this trigger, is that correct? Am I thinking about that right?

MS. FRANKE: It doesn't have to be new data; in that it doesn't have to be new to this assessment. The requirement is that those three years need to be under the same management action. For example, under this B3 Option, you couldn't average one year of Addendum IV F with two years of Addendum VI F to get those three years. You would need to have three years of F under Addendum VI to average.

DR. ARMSTRONG: If I could comment again, Mr. Chair.

CHAIR GARY: Absolutely, go ahead, Mike.

DR. ARMSTRONG: Yes, I'm uncertain what to do with this, as some of the others are. I'm tending to keep it in for public comment, and think about it some more. I'll probably vote against this.

CHAIR GARY: All right, thank you, Mike. I would like to now go to the public, before we come back to the Board for a vote. I'll ask at this time if any members of the public would like to offer comment on this motion, and Toni, I'll look to you for any hands.

MS. KERNS: We have Charlie Witek.

CHAIR GARY: All right, Mr. Witek.

MR. CHARLES WITEK: Write a letter to the Board on this issue, and the reason that it concerned me, is that we assume that in the terminal year of the assessment, for the first time we find that F has exceeded the threshold. Now we have to wait for two years, and this is where the new data issue comes in. Yes, it's possible there will be a couple years of old data in the assessment. But let's assume it's in the terminal year of the assessment that overfishing first occurs, that we have to wait for two more years before action is taken, and one of the points nobody ever wants to talk about is, yes there is uncertainty in the assessment. But uncertainty cuts both ways.

Nobody seems to be concerned that perhaps overfishing has been occurring for a few years, but

because of uncertainty in the assessment, it looks like we're sitting just below the threshold. It is very possible overfishing could have been going on longer. That is why avoiding the point estimate is probably a bad idea. We're talking about threshold here, not target. I would argue that when fishing mortality is so high that we're talking about taking action based only on the uncertainty, that it's already high enough that action is warranted. Thank you.

CHAIR GARY: Thank you, Mr. Witek. Toni, are there any other members of the public who would like to offer comment?

MS. KERNS: We have two additional members, the first is Bob Danielson, and then he'll be followed by Julien Frank.

CHAIR GARY: All right, Mr. Danielson.

MR. BOB DANIELSON: Thank you, Mr. Chairman, I appreciate the opportunity to speak. I am in full support of this motion. I believe waiting for three years under any particular amendment for data is too long, and it has the ability to negatively affect the stock by overfishing. Until we get that third year of data in, it may be putting us behind the proverbial eight-ball. Again, I support this motion to remove Option B3. I think it's dangerous. Thank you, Sir.

CHAIR GARY: Thank you, I'll go to Mr. Frank.

MR. JULIEN FRANK: It seems like under consistent management seems to be the key word here, term. I'm just looking for a definition of exactly what that means. Then overall, just listening to the Board discuss this. It seems like people are having a hard time defining the three years in the three-year period.

Just a confusion around this discussion alone doesn't leave much confidence to this being implemented. Yes, I think you're right. Speaking as a member of the public, nothing about this is attractive. I would recommend its removal. But lastly, if I can get a definition of under consistent management that would be helpful.

CHAIR GARY: Emilie, can you provide that definition?

MS. FRANKE: With these multiyear average trigger options, under consistent management or under the same management for either two or in this case three years, means that the fishery is operating under management requirements under the same management document. For example, under the same addendum or the same amendment. Again, for example, in order to average three years, all those three years in question would need to be operating under the requirements of the same addendum.

MR. FRANK: Got it, thank you.

CHAIR GARY: Toni, any other members of the public?

MS. KERNS: I have one for sure, and I'm working in the chat to see if I have a second. Taylor Vavra.

CHAIR GARY: All right, Taylor, the floor is yours.

MR. TAYLOR VAVRA: Yes, I would just like to say that I am in agreement with Mr. Witek's comments, and that I think one thing that the Board should keep in mind is that the stock was set to be overfished in 2018, and it is now 2022, and so we're behind the eight-ball already. I think when we have data that points towards overfishing occurring.

It's really important that the Board does everything in its power to show the public that they're going to take action to recover the stock as quickly as possible. To have to wait for three years of data to point in that direction, I think is just repeating sort of where we're at now, which is like I said behind the eight ball in this whole thing. I'm in agreement and support that this be removed. Thank you.

CHAIR GARY: Thank you, Taylor, Toni, did we resolve the other person's audio?

MS. KERNS: One last name, Greg Cudnik.

CHAIR GARY: All right, Greg, you have the floor, and then we're going to bring this back to the Board.

MR. GREG CUDNIK: Thank you, I'm in agreement with the other comments, and I support the motion to remove B3. I just feel like time is of the essence here. Thank you.

CHAIR GARY: Thank you, Greg, and Emilie, before I bring this back to the Board for a vote. Could you remind if there was a specific posture the AP had regarding this particular option? Did they have any feedback specific, just as a reminder to the Board?

MS. FRANKE: One AP member did note concern about both of the multiyear average options, B2 and B3, while a few other AP members noted support for considering these multiyear average options in general.

CHAIR GARY: Thank you, Emilie. All right, it's pretty clear we're not going to get a vote through consent, so we're going to have a vote. Does the Board need time to caucus? Anyone raise their hand and we'll provide some time if you need it.

MS. KERNS: I see hands raised for caucus, and I believe Max Appelman, he had his hand up before you asked about caucus, so I don't know if he has a question for clarification.

CHAIR GARY: That's fine, Max, go ahead. Did you have a question before we move to a caucus?

MR. APPELMAN: Yes, I mean I just wanted to highlight what, I think Justin brought it up initially in that, I'm hearing a lot of focus on the years of data. Basically, the PDT recommendation about the years of data, new data we would need to evaluate this, rather than focus on the intent of what this option does, which is to smooth out the variability of F from year to year.

I think what I heard from Justin is, come final action, we don't need to have that strict three new years of data under a management action in there. What I would like to hear from the public is if that variability in F is, if it swings so much from year to year under consistent regulations, does it make more sense to evaluate three data points against this threshold or two?

I would like to hear that, and that's why I'm going to again, sorry to have the last word here, but I think we should keep this in, get the public opinion, and come final action if that is a sticking point, we have the ability to remove that limitation of about new years of data.

CHAIR GARY: Given the level of complexity in what I'm hearing in the tenor of the discussion. We're going to go ahead and do a three-minute caucus. Toni, can you set the timer?

MS. KERNS: We will do.

CHAIR GARY: All right, we will go ahead and call the question then, Toni, are you ready for us to call it?

MS. KERNS: I am ready.

CHAIR GARY: All those in favor of this motion, should I read this into the record, Toni?

MS. KERNS: I don't think we've changed it, so I don't think you need to read it into the record.

CHAIR GARY: Okay, very good, thank you. All of those in favor of the motion, please raise your hand, Toni will get the count.

MS. KERNS: Just going to give the hands a moment to settle here. I have New Hampshire, Pennsylvania, Maine, Rhode Island, District of Colombia, Maryland, New York, Virginia, North Carolina, and Potomac River Fisheries Commission.

CHAIR GARY: Hands down, all those opposed to the motion, please raise your hand.

MS. KERNS: I have New Jersey, U.S. Fish and Wildlife Service, Connecticut, NOAA Fisheries, Massachusetts, and Delaware. Put the hands down.
CHAIR GARY: Are there any null votes?

MS. KERNS: I have no null votes.

CHAIR GARY: Are there any abstentions?

MS. KERNS: I have no abstentions.

MS. FRANKE: Mr. Chair, I have 10 in favor and 6 opposed.

CHAIR GARY: All right, thank you, Emilie, so the motion passes 10 to 6. Thank you very much. Emilie, just double checking where we are. Does that put us through that section or is there more to do there?

MS. FRANKE: Mr. Chair, I don't have any additional slides, but if there is any other discussion before I move on to the next section, just let me know.

CHAIR GARY: All right, so I'll put the question back to the Board. It looks like we're through management triggers, but if we're not and I'm in error, please raise your hand. One last chance before we move on to the next section. Anyone, Toni?

MS. KERNS: I have no hands, Mr. Chair.

CHAIR GARY: Emilie, I think it's safe to say we can move on to the next section.

MS. FRANKE: Moving on to the next section of Draft Amendment 7. This part of my presentation will cover Section 4.2.1, which are the recreational size and bag limit options to protect strong year classes, and I'll also review the new rebuilding section 4.4 before pausing for questions. Starting with the measures to protect strong year classes.

The Board and stakeholders have expressed that protecting strong year classes is important for stock rebuilding, and in particular there is some concern that the strong 2015-year class will soon be entering the recreational spot limit for the ocean region of 28 inches to less than 35 inches, and if this ocean slot is maintained, the 2015-year class may be subject to high recreational harvest mortality in the ocean, potentially reducing its potential to help rebuild the stock.

This 2015-year class is also subject to release mortality coastwide, and that year class has already been available to the Chesapeake Bay fisheries for the past few years. The Technical Committee also noted that both the 2017 and the 2018-year classes were above average in multiple juvenile abundance indices. These year classes have recently become available to the Chesapeake Bay fisheries.

The options in this section consider whether to change the ocean and/or the Chesapeake Bay recreational size and bag limits to enhance protection of these strong year classes. The intent here is to reduce harvest on the 2015, 2017, and/or 2018-year classes, by shifting that harvest to other year classes. It's important to note that while this would provide some protection from harvest in the short term, those year classes will still be subject to recreational release mortality. Then another point.

MS. KERNS: I'm sorry to interrupt you. Your presentation is on pause, so we're still seeing the management trigger. Perfect, thanks.

MS. FRANKE: Thank you so much, Toni. A final point to consider here throughout this section, and something that the Technical Committee and the Plan Development Team emphasize, is the uncertainty around how angler behavior and fishing effort would change in response to changes in size limits, and changes in fish availability.

The options proposed for the ocean recreational fishery are listed on the slide here. Option A is the status quo slot of 28 inches to less than 35 inches, with a one-fish bag limit. This status quo option would maintain the current state implementation plans and CE programs from Addendum VI. Option B is a 35-inch minimum size limit and a one-fish bag limit.

Option C is a 32-inch to less than 40-inch slot, with a one-fish bag limit, and Option D is a 28-inch to less than 32-inch slot, with a one-fish bag limit. Just important to note here that if the recreational size

limit does change from the status quo through Options B, C, or D, those new size limits would also apply to the Chesapeake Bay spring trophy fishery, which is considered part of the ocean fishery for management purposes.

This is something the Board discussed at the October, 2021 board meeting, because this fishery targets coastal migratory striped bass. Next are the options proposed for the Chesapeake Bay recreational fishery. Option A is the status quo of an 18-inch minimum size limit, with a one-fish bag limit, and again this status quo option would maintain current state implementation plans and CE programs from Addendum VI.

Option B is an 18 inch to less than 23-inch slot limit, and a two-fish bag limit, and then Option C is an 18 inch to less than 28-inch slot limit, with a one-fish bag limit. There are two sub-options for Option C. Option C1 would maintain all the components of Addendum VI, CE programs for the Chesapeake Bay, except the recreational size limits would be modified to include an upper bound of less than 28.

Sub-option C2 would require new CE proposals to be submitted, so the Board would have to select either Sub-Option C1 or C2. If alternative recreational measures are selected through any of those alternative size limits, the Board will need to address conservation equivalency considerations.

First here under Tier 1, this considers how or if conservation equivalency could be applied to these alternative size and bag limits to protect year classes. Under Option A, CE would be permitted, subject to any restrictions or requirements that are selected later on in the CE section of the Draft Amendment.

Just to note here, the PDT does not recommend this Option A, because allowing CE could compromise the goal of setting specific size limits to protect particular year classes. Under Option B, CE would be permitted with certain limitations on the range of CE measures that could be proposed, again subject to any restrictions selected in the CE section. Under Option C, CE would not be permitted. Another consideration for conservation equivalency here is under Tier 2, and that considers how changing the recreational size limits would impact current Addendum VI CE programs that combined recreational and commercial measures to achieve the Addendum VI reduction.

Specifically considering CE programs that implemented a less than 18 percent reduction in commercial quota, offset by a larger reduction in recreational removals. Under Option A here, the commercial quota levels implemented through those CE programs would carry forward, and under Option B, those commercial quota levels implemented through Addendum VI CE, would not carry forward, and those states would be subject to the FMP standard quotas.

In addition to the options themselves, the Draft Amendment outlines the analysis developed by the Technical Committee and the Plan Development Team, to evaluate the size limit options. The TC first estimated the length at age for striped bass, which then informed estimates of the level of protection that each size limit option would provide, referred to as the percent protected from harvest, or the percent that each year class that is outside the size limit.

The TC then developed projections to evaluate the potential impact on stock productivity, and impact to the rebuilding timeline for the alternative size limits, as compared to the status quo. This table on the screen shows the estimated average stripe bass length at age, based on age data compiled for the last stock assessment.

The average length at age for the 2015-, 2017-, and 2018-year classes in 2023 are bolded here. It's important to note here that these length at age estimates are coastwide estimates that are based on data compiled from several states. Since size at age is highly variable along the coast, these average length at age for the Chesapeake Bay may differ from these coastwide estimates used for this analysis.

For the percent protected analysis, all the size limit options considered in this section would provide greater protection from harvest for all three-year classes in 2023, relative to the status quo. However, that level of protection will change over time, as those fish continue to grow. The PDT noted that this percent protection analysis is useful to compare the relative changes in protection among the different options.

But there are some limitations to this analysis, one being that this analysis doesn't account for the differences between ocean and Chesapeake Bay fisheries, and when different size fish are available in those regions. In addition to this percent protected analysis, the PDT also estimated the reduction in removals that each option would provide, relative to the 2017 removals.

All the options presented in this section are estimated to achieve at least an 18 percent reduction in removals, relative to 2017. This is consistent with the required Addendum VI reduction. I mentioned the TC developed projections to consider the potential effects of alternative size limits on spawning stock biomass levels, as compared to the status quo option. These projections assumed a constant level of fishing mortality for each scenario, so assumed fishing at the F target, and these projections also assumed fishing effort was the same and constant for each scenario. These projections changed the selectivity pattern for each size limit scenario, based on what proportion of each year class would be available to the fishery. The initial set of projections were developed based on changing the ocean size limit only, and then an additional set of projections were developed considering changes to both the Chesapeake Bay and the ocean fisheries.

Details on those projection scenarios were provided in the appendix of the draft document. A couple key findings to note here from the Technical Committee. For all the projection scenarios, the stock recovery timeline, so that's the year when SSB would exceed the threshold, and the year when SSB would exceed the target, is the same for all scenarios, including for the status quo scenarios.

Another finding is that the overall projected change in total spawning stock biomass, relative to the status quo, is positive for most scenarios. However, that percent change in total SSB under the different size limits is not statistically significant. These results indicate that changing the selectivity does not have a significant impact on rebuilding the stock, if fishing mortality stays constant.

If the goal is to expedite stock rebuilding, then controlling the overall fishing mortality rate is more important than only changing the selectivity through changing size limits. After a discussion of these options and the analysis regarding the year class protection, the PDT is recommending that the Board remove this section from consideration in Draft Amendment 7.

If these options are removed, then the Addendum VI FMP standard for recreational size and bag limits would be maintained for Draft Amendment 7. The FMP standard for the ocean recreational fishery would be 28 inches to less than 35-inch slot, with a one-fish bag limit, and then for the Chesapeake Bay the FMP standard would be the 18-inch minimum size limit and a one-fish bag limit.

As I mentioned previously, the status quo options would maintain the current state implementation plans and CE programs from Addendum VI. The PDT is recommending removing these options for two primary reasons. The first is the projection results, and again the results indicate that the stock recovery timeline is the same for all size limit options, including the status quo.

The Board added this issue of protecting year classes to Draft Amendment 7, in order to support stock rebuilding, but these projections indicate that changing the size limits does not have a significant impact on rebuilding the stock, if the F rate remains constant.

The PDTs second reason for their recommendation is that selecting new recreational measures through Amendment 7, before the 2022 stock assessment update, would present some significant timing

challenges, especially considering the uncertainty of how Amendment 7 measures would align with the stock assessment results. In other words, there is uncertainty as to whether Amendment 7 measures would achieve stock rebuilding. For example, if the assessment indicates that a reduction would be needed to rebuild the stock, Amendment 7 measures may or may not achieve that reduction. If they don't, then the Board would have to reconsider recreational measures again after the assessment, and that would mean reconsidering new measures again during the same year. On the other hand, the assessment could indicate that the status quo Addendum VI measures may achieve stock rebuilding, and if that's the case, then changing measures through Amendment 7 may not be warranted at this time.

In either case, this would present some conflict with the Board's desire for management stability. Regarding Advisory Panel input. One AP member noted support for removing these options from the document, considering the process of adjusting to changes in recreational measures and size limits can be costly for the industry.

On the other hand, several AP members noted support for maintaining these options in Draft Amendment 7. Those AP members noted that the public should have the opportunity to comment on alternative size limits, and what they want to see in the fishery. They also noted that some size limit options would result in a greater reduction in harvest, and some alternatives may reduce release mortality.

Additionally, some AP members noted that diverse age structure is also important to consider, and that although these options may not significantly increase spawning stock biomass, protecting these strong year classes is still important, considering that future recruitment is highly variable.

One AP member also noted the use of closed seasons to protect year classes, and some AP members noted the potential relationship between protecting large fish and the quality of striped bass eggs and recruits. That wraps up the year class section, and before I pause for questions and discussion on that section, I'm going to review the rebuilding section as well.

This section provides some additional context on the timing of the stock assessment and Amendment 7 that I mentioned earlier. When the benchmark stock assessment was accepted for management use in 2019, the spawning stock biomass threshold trigger was tripped, and the Board is required to rebuild SSB to the target by no later than 2029.

The Board has expressed some concern about the recent low recruitment estimates, and the potential impact of this low recruitment on the ability of the stock to rebuild. As part of the analysis for the recruitment trigger that we discussed earlier in the Draft Amendment, the TC identified 2007 to 2020 as a low recruitment period, and that's based on the Maryland Juvenile Abundance Index.

These several years of poor recruitment may indicate that the level of removals that was sustainable during an average or an above average recruitment period, may not be sustainable during this low recruitment period. This section of the Draft Amendment considers which recruitment assumption to apply to the rebuilding calculations, and it also outlines the rebuilding plan framework, and responding to the 2022 stock assessment results.

I mentioned the 2022 stock assessment update is expected to be complete and presented at the October board meeting, and this assessment will provide updated spawning stock biomass and fishing mortality reference point values, and it will also provide an updated evaluation of stock status, with a terminal year of 2021. This assessment update will incorporate two years of data under Addendum VI, that's 2020 and 2021. The assessment will also calculate the fishing mortality rate that would be required to rebuild spawning stock biomass to the target by 2029, and this is referred to as F rebuild.

F rebuild is distinct from F target in that F rebuild takes into account that ten-year rebuilding

timeframe. On the other hand, F target is calculated to achieve the target in the long term, without taking into account a specific rebuilding timeframe. Finally, the assessment will provide stock projections going forward.

The option for consideration in this section is related to calculating this F rebuild. F rebuild could be calculated using different assumptions for recruitment. Typically, F rebuild is calculated by drawing recruitment from values observed from 1990 and forward. This is referred to as the standard recruitment method, which is Option A.

However, F rebuild could be calculated by drawing recruitment only from a below average period, and this is the Option B, referred to as the low recruitment regime assumption. Using the low recruitment assumption in Option B would be a more conservative approach that would result in a lower F rebuild value to achieve stock rebuilding by 2029.

From the Advisory Panel, some AP members noted support for this more conservative approach, especially considering the recent low juvenile abundance index values. The figure in this section of the Draft Amendment outlines how Amendment 7 will inform the 2022 stock assessment update.

Amendment 7 with potential final action in May, will determine the recruitment assumption used for the assessment, as I just described, either the standard recruitment method, or the low recruitment assumption. Draft Amendment 7 at this point includes the year class options for selecting recreational size and bag limits, and the Amendment maintains status quo commercial measures.

Then moving into the 2022 assessment in October. That assessment again, will provide an updated evaluation of stock status. The assessment will calculate F rebuild, using the recruitment method selected through Amendment 7, and the assessment will also develop stock projections, taking into account measures under Amendment 7.

There are two potential outcomes of the 2022 assessment. The first on the left with the green box would be the good news, if the projections indicate that the rebuilding target will be achieved under Amendment 7 measures, then those Amendment 7 measures are sufficient for rebuilding, and those measures would be implemented in 2023.

On the other hand, on the right side in the red box, the assessment could indicate that Amendment 7 measures will not achieve the rebuilding target. In that case, the assessment would calculate what reduction would be needed to achieve F rebuild, and an addendum could be developed in 2023, to consider new measures that would meet that required reduction. In that case, those addendum measures would likely not be implemented until 2024. Then in either case, the next opportunity after that to evaluate rebuilding progress, would be the following stock assessment, potentially a benchmark, maybe around 2025. Mr. Chair, that wraps up my slides on the rebuilding section and on the year class section, and I'm happy to take any questions on either section.

CHAIR GARY: Thanks very much, Emilie, and I appreciate you covering both of those sections, because of the inherent linkage between the two of them. That helped me a lot, hopefully it helped others. At this point, what we're going to do is just go with questions for now, and then go into the discussion as we did in the previous section. Toni, I'll look to you for hands raised for questions for Emilie.

MS. KERNS: Thank you, Mr. Chair, I have Megan Ware, Justin Davis and John McMurray.

CHAIR GARY: Okay, Megan.

MS. WARE: This question may be most appropriate for Katie, because we were admittedly e-mailing back and forth about it. But my question is, in Table 4, that table presents different ocean size limits, and it looks at the reduction in total removals. There are some options there, such as Option B, which is a 28 inch to 32-inch slot that results in a

higher level of removals than the options we chose previously.

However, when looking at the appendix, that same option results in the worst outcome for SSB, and then conversely there is the 35-inch minimum that results in the smallest reduction in total removals, but the best outcome in SSB. I found those results to be a bit confounding, so I'm hoping that either staff or Katie is able to help explain those outcomes.

MS. FRANKE: Thanks, Megan, I'm going to defer to Katie, if she could take this question.

DR. KATIE DREW: Sure, it's a good question, and I think it is maybe a little unintuitive. But I think the thing to keep in mind is that the Technical Committee's analysis specifically separated the effects of a reduction in removals, and the effects of changing what ages or sizes the fishery is operating on through the size and bag limit changes.

We did not account for any potential reduction in removals that those regulation changes could cause. We only focused on, if F was the same across, essentially if removals or effort was the same in all of those different options, which option would provide the best outcome for the stock, in terms of spawning stock biomass. This was done, like I said, to kind of separate that effect of, some of these regulations may or may not cause a change in removals from 2020 levels, from status quo levels.

We wanted to focus on, what's the effect, just in terms of their ability to protect that year class. Overall, as Emilie said, the analysis showed that controlling F is really more important than any of the options that we looked at, any of the options in this document, in terms of affecting the selectivity, and effecting what proportion of the population is vulnerable to that fishery. While those options, I think while that Option B might reduce harvest in the short term, because it is more restrictive than the current status quo measures. It wouldn't necessarily do any better of a job than any other options that would provide the same level of removals. Hopefully that helps, if not I can try to explain further.

MS. WARE: A quick follow up if I may, Mr. Chair.

CHAIR GARY: Yes, go ahead, Megan.

MS. WARE: Yes, I appreciate that, Katie. Yes, I guess to summarize that maybe, and you can tell me if I'm wrong in saying this. These projections are looking at a change in selectivity, and not any accompanying change in total removals that may come with that management change. Is that correct?

DR. DREW: Yes, that is correct.

MS. WARE: Okay, thank you.

CHAIR GARY: Toni, I hate to ask you again. I thought I heard you say John McMurray, but there were a couple others I didn't quite get.

MS. KERNS: Justin Davis first, then John McMurray, and now Tom Fote is in the queue.

CHAIR GARY: Okay, Justin, you have the floor.

DR. DAVIS: I'm going to try to sneak in two questions here on my one question. Both questions pertain to the rebuilding plan, and specifically the low recruitment assumption. I'm wondering if there is some way, when we send this out to public comment, to illustrate to the public the actual sort of difference that it would make to select our status quo approach to F, versus the F rebuild characterized by low recruitment.

I mean we can tell the public that the status quo approach is using the full time series of recruitment from 1990 forward, and the low recruitment approach is using just the time series from 2007 forward, where recruitment has been low. But I'm wondering if it would be possible to do something like a retroactive analysis of the Addendum VI outcome, had we used the more conservative estimate of recruitment.

How much higher of a reduction removal would we have been looking at in Addendum VI, had we made that more conservative assumption about

recruitment? I'm wondering if there is something we can do to put in the document to demonstrate to the public the actual difference that choosing that F rebuild will make.

The second question I have is, we often think with these documents that the Board has the latitude at final action to select an option that's within the range of options contemplated in the document. Is that in play here, you know essentially, we have two options here, characterized by using two different time series of recruitment to characterize recruitment. Could the Board potentially at final action, select some intermediate option to characterize low recruitment that uses a different set of years from the recruitment time series?

MS. FRANKE: To your first question about demonstrating, sort of more clearly demonstrating what selecting either of these options that are now up on the screen would mean. As part of the initial recruitment trigger analysis, the TC did look at a few different scenarios using, well I guess it was a high versus a low recruitment regime.

I'll maybe hand it over to Katie, to see what we could put together to better demonstrate what it would mean for F rebuild, in terms of which option is selected here. To your second question about choosing a range of options. Potentially selecting or choosing a recruitment assumption that's somewhere between A and B. The only thing I would say about that is the TC hasn't identified any sort of intermediate option, so I'm not exactly sure what that would look like.

MS. KERNS: Emilie, I'm going to fill in, Marty, if that's okay. Justin, the Board in other species, and this species have done before. They've chosen an option that fell between Option X and Y, as long as it fell amongst the range then it was in play. We've never done that before, to my recollection in a rebuilding calculation.

But I don't see why it wouldn't be able to do that, as long as we could figure out a way to calculate it. I'm just trying to think through that. That would be the tricky part in my mind. You know, and the Board acknowledged that that is something that they are willing to do here.

DR. DREW: Just to, I think, follow up on the first part of that question, which was, can we do something to illustrate this the better for the public. I would say, if the Board is interested in that, I think we could definitely develop something. I think as Emilie was saying, our first sort of cut at this we were saying, the F under a low recruitment regime, the F target under a low recruitment regime would be something like 0.18 as opposed to 0.20.

But I think we didn't apply that for the rebuilding concept. But I will also say, you know I think we would want to be very careful not to do anything that could conflict with the results of the upcoming stock assessment, so that I don't want to put anything out there that looked like a rebuilding plan, based on the 2017 assessment, because the Board never requested any kind of information like that from the TC.

There are some projections that exist out here already. We could do something similar for this, with this lower recruitment. But I think we would just want to make sure that we don't put anything out there that will then later be superseded by the upcoming stock assessment.

CHAIR GARY: Justin, do you have a follow for that?

DR. DAVIS: No, I'm good, thank you everybody for those thoughts.

CHAIR GARY: We're still on questions, and before I go to John McMurray, I just want to mention, in our agenda we've got to stop at 3:30 for a 15-minute break. I would like to honor that, so everybody could just take a breather. Again, we're on questions only now, so John McMurray.

MR. McMURRAY: I have a question regarding measures to protect 2015-, 2017-, and 2018-year classes. I do understand the rationale for the PDTs recommendation to take that out, particularly the timing challenge of selecting new measures before the '22 assessment. In something like a 35-inch size

limit protects the 2015s for a few years, and then once they reach 35 or 36 inches, well they aren't protected, and thus there is no real benefit in the long run.

But I do understand. While I understand that, wasn't the intent here to protect those good years classes, particularly the 2015s, until they could contribute significantly to the female SSB before they were harvested? I mean it certainly seems like something like a 35-inch limit would achieve that.

Yes, I understand we're just redirecting F on other year classes, but it's the 2015s that are abundant that we hope would make a significant contribution to SSB. Maybe, Emilie, you could explain the rationale to me a little better, because I still don't quite get it. I'm not going to oppose taking it out, but I need to understand a little better how you guys are determining that it won't work.

MS. FRANKE: The PDT isn't saying that these measures won't protect year classes. Based on the percent protected analysis, that indicates that these measures indeed will protect these year classes. What the PDT is highlighting is that changing the size limits to protect these year classes, won't significantly impact the total spawning stock biomass levels, and therefore the stock won't recover any faster than it would under the status quo slot limit.

This analysis is showing that these year classes will be more protected, but that protection won't lead to significantly speeding up the time by which the stock would recover. For the PDT it was really that result from the projections, coupled with the timing challenges with the upcoming assessment.

The uncertainty around if any of the measures proposed in this section, whether it's the status quo or any of the alternatives, would achieve rebuilding. We just won't know that until the assessment. It's a combination of the projection that these measures won't expedite rebuilding, along with the timing challenges that led the PDT to this recommendation.

CHAIR GARY: Did that answer your question, John, or did you have a follow?

MR. McMURRAY: It did answer my question, but there is disconnect here somewhere. It seems counterintuitive that a super abundant year class, once it recruits, wouldn't somehow expedite the rebuilding, or make a major contribution to female SSB. You know I guess I'll have to leave it to people that are much smarter than me, because I do trust the PDTs analysis, so thank you.

CHAIR GARY: Next up is Tom Fote.

MR. FOTE: I didn't see any analysis when I'm looking through this, by putting more restrictive measures and smaller slot limits. We know that's going to increase the hook and release mortality, and what are the consequences of basically making those changes that will produce more hook and release mortality, since hook and release mortality is the major mortality in this fishery, as far as the recreational, and almost as big as the commercial and recreational mortality combined.

That's the first question. Second question, I'm kind of confused here. We're making all these assumptions that by increasing the spawning stock biomass we're actually going to have great recruitment. But nowhere do I see in this rebuilding, that this is based on also the right environmental conditions.

Because we can try to basically protect the spawning stock biomass, but we can't control the environment. We've had good recruitment with much lower stock assessment than we have right now. I'm just looking to where that's going to state in the document, because we're building peoples hopes on a document that I see is wrong about that.

MS. FRANKE: Thanks, Tom.

CHAIR GARY: Yes, Emilie, I think I understood part of Tom's question. Are you good with that?

MS. FRANKE: Yes, so I can try to address both aspects. The first question about the increase in

release morality associated with changing the recreational size limit. As part of the analysis in the calculations of what the change in total removals would be for each option, relative to 2017. There is a table in the Amendment that outlines how those changes to the size limits would impact harvest, and how the predicted changes to release mortality.

For all of the options there would be a pretty significant reduction in harvest, and release mortality would just increase by a couple percentage points, resulting in a reduction in total removals, somewhere between 18 percent all the way up to 30 percent. The calculation of the percent change in removals for these options does address release mortality.

However, something that the TC and PDT emphasized is that there is uncertainty as to how angler behavior and effort will change if the size limits change. Also, depending on if certain year classes become more or less available to the fishery. While the analysis takes into account release mortality where possible, all of the analysis assumes that effort would remain constant, and that is a big source of uncertainty. Then as far as your second point about recruitment, and the importance of environmental conditions for a successful recruitment.

As part of the recruitment trigger section, the PDT does note that there is a weak stock recruit relationship for striped bass. The environmental conditions do play a big part, and as far as the recruitment trigger goes. You know responding to periods of low recruitment by reducing fishing pressure, won't necessarily increase future recruitment because of that weak stock recruit relationship. The PDT did try to address that earlier in the document.

CHAIR GARY: Tom, did that adequately answer your questions, or do you have a follow?

MR. FOTE: It just doesn't do what we, in the section we were talking about putting all these restrictions, it should also mention it in this section also, because we're setting expectations. We did that with summer flounder. We basically set expectations that we protect the spawning stock by raising the size limit constantly.

We're going to do good, and we're not seeing, we're seeing poor recruitment, and when we had smaller size limits we saw better recruitment. We constantly tell that to the public. They are expecting us to basically do this a lot of times, and it's not working. It's not working in a lot of species. I don't know how it's going to work with striped bass, because the environment is already changing, global warming and everything else that comes into play.

CHAIR GARY: Okay, thank you, Tom, I appreciate that. Toni, are there other folks queued up with questions for Emilie and staff?

MS. KERNS: Yes, we have three additional names, we have David Sikorski, Pat Geer, and Jesse Hornstein.

CHAIR GARY: Okay, Dave Sikorski, you are up, and happy belated birthday.

MR. DAVID SIKORSKI: Thank you, Mr. Chairman, I'm glad the scheduling occurred today not yesterday for this meeting. Like in the last meeting, I've had a lot of focus on what stock we're exploiting in the Chesapeake, and then also what's being produced by the current spawning stock, and you know we see through our young of year surveys. In looking at the rebuilding piece, the question that comes to mind, even more so now after Dr. Davis' comments about the bookending of a potential range of options.

I wonder if the Board could direct staff or TC to go even lower with the assumptions about recruitment. I think it would provide important guidance if we continue to see the Chesapeake, or at least the Maryland portion of the Chesapeake fall below average, and just be smart in a sense of the bookending component. Help me understand if I'm off here. I'm thinking that is a more conservative approach doable, and maybe it's not from an average perspective, based on past data. But is it

doable? I guess I'll stop there, I think that is my question.

CHAIR GARY: Emilie, are you good with answering that?

MS. FRANKE: Thanks, Dave, for the question. Yes, I might defer to Katie here in a moment. Dave, it sounds like you're thinking, you know looking at Option B, which I'll put up on the screen, this low recruitment regime. You're trying to think if there would be an even more conservative option than this Option B.

The only thing I'll say to that is that based on the analysis the Technical Committee used to identify these periods of high and low recruitment. You know this is the low recruitment period they identified, so I'll defer to Katie if there is potentially additional analysis that could identify an even more conservative option at this point.

DR. DREW: Yes, I think we could develop, for example, the low recruitment regime that we saw during the period of stock decline from about the 2010s forward, was definitely not as low as some of the past low recruitment regimes we've seen, even within the stock assessment. If the Board was interested in seeing, you know what would rebuilding look like under recruitment levels that we saw in the early eighties, which was truly a low point for recruitment for this stock. That is something we could put together.

We could pick a different percentile of that low recruitment regime, so instead of picking say the average or the median, pick the 25th percentile of recruitment in that regime. I think we would obviously look to the Board for some sort of guidance on that kind of information. But I think, you know keeping in mind that talking about rebuilding to 2029, future recruitment in the near term isn't going to be a big impact on that timeline. It really is predominantly going to be what's already in the system, so to speak.

MR. SIKORSKI: Thank you, no follow ups.

CHAIR GARY: We have two other folks that had questions. I would like to make a clean break. It's 3:30, but if we can squeeze these questions in, take a break and then come back, and then pick up with the discussion, that would be my preference. But this is a sensitive topic, we can all tell. Toni, I guess a question before I go to Pat. Are there several more people that are queued up for questions, or do you think this might be the last couple?

MS. KERNS: There are no additional Board members.

CHAIR GARY: Okay, let's see if we can do that then, so Pat, I'll go to you, and then we'll go to Jesse, and then we're going to take our 15-minute break.

MR. PAT GEER: Mr. Chairman, I'm going to make this easy on you. I had a comment, and not a question, and I'll hold that comment until later.

CHAIR GARY: Thank you, Pat, Jesse, you have the floor.

MR. JESSE HORNSTEIN: My question is, if the projections were done, well, for the ones that were done using the standard recruitment levels to get back to the F target level. If they used the low recruitment regime to do those projections, would it be more important to protect large year classes under the low recruitment regime, as opposed to the standard recruitment regime? That would be my question, thanks.

MS. FRANKE: Thanks, Jesse. I'm going to again defer to Katie to see if there is any information we can provide, because as you mentioned, yes, the projections for the year class section were done using the standard recruitment assumption.

DR. DREW: It's hard to predict exactly how those two would interact. I think probably the key would be protecting those year classes from the beginning, as opposed to right now, where we're sort of trying to come in a little late on some of these year classes that have already been, I mean these fish, striped bass are vulnerable to the fishery from about Age 2 onwards. I think, you know trying to come in a little

late on the protecting the year class may have less of an impact than, you know if we did this rebuilding plan and tried to protect strong year classes as they enter the fishery. In the future, down the line, that might have more of an impact. Whether it would have more of an impact, whether it would be more important to protect those strong year classes during a weaker recruitment regime. I think we would have to sort of run the math, and see if the benefits would be stronger in that situation. But it's not unreasonable to assume that.

CHAIR GARY: Thanks, Katie, Jessie does that answer your question, or do you have a follow?

MR. HORNSTEIN: No, that answers it, thank you.

CHAIR GARY: All right, thank you, Jesse. Emilie and Toni, I think we're just a couple of minutes over, I'm showing 3:34. I would like to go ahead and take the 15-minute break now, and then transition over to discussion on this section, of these two sections. We'll go ahead and break now, and Toni, if that's okay, we'll reconvene at, it would be 3:50, correct?

MS. KERNS: Correct, Marty.

CHAIR GARY: All right, so we'll go ahead and take a 15-minute break, everybody catch their breath, get their thoughts together, the Board, and we'll go ahead and discuss these two combined sections. Thank you.

(Whereupon a recess was taken.)

CHAIR GARY: Welcome back everyone. We're going to now transition to the discussion phase for these sections that Emilie just covered. I would like to go ahead and open up to the Board, if you could raise your hands and indicate who would like to start the discussion. Again, we're looking at potential modification, removal, and possibly addition as well. Toni, do you have any hands up?

MS. KERNS: I do, Marty, I have Mike Armstrong.

CHAIR GARY: All right, Dr. Armstrong, you're on.

DR. ARMSTRONG: I have a motion, and it will add to this document. I've been struggling with where to bring this motion. But I think it's definitely germane to the rebuilding process, and it may give people a different way to think about the two things we're going to discuss right now. It might delay things, but I would like to get it on the table, and perhaps you can decide if we talk about it now, or maybe shove it down the road a little bit. I don't know, Emilie, do you have the motion?

MS. FRANKE: I do, yes. It should be on the screen momentarily here.

DR. ARMSTRONG: I will read it. Move to add an option to Section 4.4: Rebuilding Plan that considers an alternative process for responding to the 2022 stock assessment as follows: If the 2022 results indicate the Amendment 7 measures have less than a 50% probability of rebuilding the stock by 2029 (as calculated using the recruitment assumption specified in Amendment 7) and if the stock assessment indicates at least a 5% reduction in removals is needed to achieve F rebuild, the Board may adjust measures to achieve F rebuild via Board action. Just very briefly, this is about expediency, and the important element is it would take out the addendum process and make it a specification process for the Board. If I get a second, I'll explain a little bit more.

CHAIR GARY: Thank you, Mike, is there a second to Dr. Armstrong's motion?

MS. KERNS: I have Jason McNamee.

CHAIR GARY: Thank you, Jason, Mike, it's back to you to build on your rationale.

DR. ARMSTRONG: Good, thank you. Again, I'd like to see it in the document, and we don't have to implement it when we make that decision. But it adds a backstop. I'm worried about this stock. As you know, the last three years have been really bad recruitment. By the time the stock assessment comes out, we will have a shot, we will see what the '22-year class looks like, and we don't know what's going to come out of the assessment.

It may be okay if you use poor recruitment, it may not be okay. But we've been in this, what I would term a slump, and our constituency has seen this. We've been in it a number of years. If we come out of this assessment, and we have to take a reduction, we won't put that in until 2024. I don't think we should wait that long.

I don't think the stock should wait that long for an action. You know it's unusual. It's a specification process, it cuts public opinion out, speeds it up tremendously, but it is done with other species, like fluke and black sea bass and things like that. The things that we might want to discuss. The biggest thing is the Board may adjust measures to achieve F rebuild via Board action. Even if we accept that we don't have to use it.

The other thing is its 50 percent probability of rebuilding. I think that's reasonable, that's what we usually go with. Then, I talked to a number of people. If the stock assessment indicates at least a 5 percent reduction removal. Our last plan, we had to reduce 18 percent. What I'm saying is, if it's a trivial amount. If it comes back and the TC says, you have to reduce by 4 percent, then fine.

We go through the addendum process, because things are not dire. If they come back and say we need a 20 percent reduction, then we can't wait a year, well from now it's a year and a half to implement it in 2024. That's my rationale. It's really about expediency and crafting a different route that is very quick to reduce F if we need to, and we may or may not use this. But I would like to see it in the document in Section 4.4, the rebuilding part.

CHAIR GARY: Jason, would you like to expand any thoughts you have for your second?

DR. JASON McNAMEE: I won't say too much. I've been just kind of thinking through the process here, thinking about the last process with striped bass, and I think folks were getting really frustrated with the amount of time that things were taking. They feel a real immediate sense of the need for action. I think I really appreciated Dr. Armstrong's motions, kind of thinking out ahead a little bit, getting us positioned to be able to react quickly, rather than having to bear the frustration of kind of letting all of the sequences line up. I think it's a smart move to think out ahead of this a little bit, get ourselves positioned to be able to react quicker than we normally would be able to, if we get continued bad signals out of the stock assessment.

CHAIR GARY: Given the time and we have two more sections to cover, but the importance of this particular one, and I think a lot of folks on the Board and the public, folks I've talked to, I'm sure others have as well. Ever since the Plan Development Team memo came out, this is a thought that has come into their head. I think this is going to help us to have this discussion, so we'll go ahead and pursue this now.

I'm going to go ahead and open this up to discussion with the Board, and we'll go ahead and decide. This, or course, is going to be an additive component, and I would also like to give the public an opportunity to comment on this, before we go to a vote on this. I'll open it up, Toni, to the Board for questions and comments.

MS. KERNS: We have Mike Luisi, Megan Ware, Justin Davis, Max Appelman, and Joe Cimino.

CHAIR GARY: Toni, who was third in the cue? It was Mike, Megan, and then who was the third one you had?

MS. KERNS: Justin.

CHAIR GARY: Justin Davis and then Joe Cimino, correct?

MS. KERNS: Max is in between Justin and Joe.

CHAIR GARY: Got it, okay, we'll go first to Mike Luisi.

MR. LUISI: My question, well let me first say that I absolutely support the idea behind this motion. I've been thinking about it myself a lot, as to how we may be able to react to the upcoming assessment in

a timely way, to make adjustments if necessary. I appreciate, Mike, you thinking about this as well, and putting this before us. My question to you, Mike, is as far as intent on making adjustments to the measures. Do you foresee, as you used in your example?

Let's say an 18 or let's say a 20 percent reduction is necessary from the results of the stock assessment. Do you envision the Board using the specifications process to approve that 20 percent reduction, and then states will craft measures to achieve that via data that they would use in other cases, like through a conservation equivalency program? Do you foresee the Board in this case selecting the Chesapeake Bay alternatives, or measures, and the coastal measures, and establishing new measures, which are specific to actual regulations that would need to be implemented?

DR. ARMSTRONG: The way I envision it is, at the October meeting we would get the stock assessment results. If it comes back, we need X amount of reduction, we put this in action. We charge the TC with coming up options to achieve that. They come back in January, and we're presented with a suite of options, and the Board picks.

But I think probably in this is you go the other way, where we say this is the reduction you need. Well, no, let me take that back. My intent was that the Board will make that decision, and then the whole CE will be complicated by what we pick for that option. It could be CE isn't on the table then, so it would all be up to what comes out of the Board.

CHAIR GARY: Mike Luisi, is that good?

MR. LUISI: Yes, Mike got clarity there, thanks, Marty.

CHAIR GARY: Next up is Megan Ware.

MS. WARE: Yes, I want to thank Mike for making this motion. I think it addresses the mismatch in timing between taking final action on this Amendment ahead of getting those 2022 assessment results. I also appreciate that this motion is really specific to the criteria that would need to be met in the assessment, to trigger the Board using this Board action and specification process.

I think I share concerns that Mike raised, about waiting until 2024 to take action in response to a poor assessment outcome. Just because the longer we wait to take action the more severe those measures are going to have to be, to meet the 2029 deadline. I support this motion.

CHAIR GARY: As we go through the queue here, if you're in support of in opposition, in the interest of time let's try to be as concise as we can, and hit our points. I just want to be conscientious of the other subject matter we have to cover, and making sure that we end. You know we are on a five o'clock stop. We could go a little bit longer, but I want to try to keep everybody on schedule. Next up is Justin Davis.

DR. DAVIS: Up front I'll say that I do plan on supporting this motion. I appreciate that intent of it in particular. I think it makes me feel better about adopting the PDTs recommendation to remove Section 4.2.1 from the Amendment, the measures to protect the 2015-year class, because this could give us a mechanism for taking quick action after the stock assessment later this year, if we get bad news from the assessment, and determine that we're not on path for rebuilding.

I do have concerns around process. I don't think we should take it lightly that we're essentially doing away with the normal public comment process we would go through before changing measures. I would just as that however this ends up playing out, whatever process we follow, that when candidate measures.

You know if we end up going down this road, and there are some potential new measures, that those are provided to the Board enough in advance of final action, that there is some opportunity for Board members, for state agencies, to do some level of outreach to the public to get some

feedback. I think it would be a really bad outcome, if we sort of got the potential suite of measures very quickly before the meeting, where we had to take final action and there wasn't time for some level of public comment. I just also wanted to clarify. Based on the language here, I'm seeing that this action is specific to the 2022 stock assessment results.

I just want to clarify that we're not essentially, by putting this in the Amendment, adding a new sort of potential tool in the tool box that the Board could avail itself of, at any time when we're in a rebuilding and we get a stock assessment that indicates that we're not on track for rebuilding. Down the road, if unfortunately, we get the next stock assessment, and it looks like we're off track for rebuilding. This would not mean that we could immediately just use this new specification process, we would still have to go through the standard addendum process.

CHAIR GARY: Mike Armstrong, is that your intention, to address Justin's last point?

DR. ARMSTRONG: Yes, this is a one use only thing, unless down the road we decide to change it. But as of now, it's we use it once, we may use it once and that's it.

CHAIR GARY: Okay, thank you, Mike. The next up is Max Appelman.

MR. APPELMAN: I definitely support this concept, the intent behind this, for all the reasons that have been said already. I think I can support the motion, but I want to echo some of the concerns I heard from Justin. Well, for one I heard specifications process, which I think is a very new term to this management board, which has already been pointed out. That's not a typical process that we go through for striped bass.

I am concerned about cutting out our normal public comment process, adaptive management process, especially for this fishery. I think what might help me be a little more comfortable, is really understanding the difference in timeline between something like this and the addendum process.

I do recognize that there is going to be some period of time in both processes, whether an addendum or this Board action that requires some TC work. You know I think there is a lot of interest in having time for Board members to meet with constituents to get their input as well. Are we able to walk through the process here on both sides, from when the assessment results are available to when final measures would be imp lamented?

CHAIR GARY: Emilie, are you able to map that out for Max and answer his question?

MS. FRANKE: Yes, I am happy to do so. For the addendum process. If the Board initiated an addendum in October of this year, 2022. If the PDT developed an addendum and the Board approved that addendum for public comment in February of 2023, the public comment period would take place in the spring, and the Board could potentially consider final action on that addendum in May of 2023.

By that point, I don't think there would be time for states to implement those regulations for the 2023 season. That's where that likely implementation in 2024 came from. As far as the motion that is on the board here. I think if this were added to the document, and if this were approved by the Board in May. I think the Board in May could task the TC with calculating or identifying a couple of options for measures, to meet the reduction, if the stock assessment report indicates a reduction is needed.

I think potentially the TC could provide concurrently with the assessment results in October of this year, could provide a couple of options for measures that would meet said reduction. I will say that if the Board does task the TC with that, it would be helpful for the Board to provide any guidance, if possible, to the TC.

For example, one slot limit, one minimum size, or something like that. Then potentially, depending on the Commission, and how things go, maybe there

could be some sort of additional special board meeting that could be scheduled, you know after the October meeting, for the Board to take final action, so that as Justin mentioned, maybe there could be some time for the Board to process those results and potential options.

Then if final action was taken by the Board in late 2022 or early 2023, similar to the Addendum VI process, I think states could potentially get those regulations implemented by April 1, 2023. I think the difference would be a potential implementation date of April 1, 2023 versus January 1, 2024.

CHAIR GARY: Did that help, Max?

MR. APPELMAN: Yes, could I ask a quick follow up?

CHAIR GARY: Sure.

MR. APPELMAN: I would agree that it would be very unusual for striped bass measures to change in the middle of the season. What I heard with the addendum process is final action would happen in May, and then there would be some time after that, maybe a couple months at most before states could get measures on the books.

That would be unusual to change measures in the middle of the season. Usually, we wait until the beginning of the next season to have those changes go into effect. I would agree that that would be unusual, but it's not out of this Board's purview to set an implementation deadline like that. I guess my follow up question would be, it sounds like there would be a very limited number of options that would be put forward under the specifications process, which I'm not necessarily opposed to.

But I'm wondering if there would be opportunity after that, considering that this is sort of a stop gap, I think I heard that term used, a stop gap approach, to be a little bit more careful and deliberate about what our more long-term management program would look like under the remaining years of the rebuilding program. Is that something that you envision, the makers of the motion, Mike and J-Mac?

CHAIR GARY: Mike or Jason, can you comment to Max's inquiry?

DR ARMSTRONG: Sure, can you say the end of your question again? You broke up on my end.

MR. APPELMAN: Yes, I am under the impression that if we went through the specifications process, the types of options that would be considered in October or late this year would be limited, there would only be a couple. Again, keeping the typical public comment process in mind and doing away with that. I wonder if there is still going to be an opportunity after that to go through the Commission's adaptive management process, to consider a more long-term measures for the remainder of this rebuilding program.

DR. ARMSTRONG: Yes. I mean I think the motion is silent on that. But I think the Board can do what they want, and I think that could be a route they go.

CHAIR GARY: Did that answer your question, Max?

MR. APPELMAN: Yes, thank you.

CHAIR GARY: I'm watching the time melt away here a little bit, but this is a really, really important discussion. We have Joe Cimino up next, and before I turn it over to Joe, I just want to mention. I do want the public to have some opportunity to react to this. Other Board members, if you have something new to add to this discussion, or we haven't heard from you today, certainly, by all means raise your hand, and I'll go to Toni after Joe. But I do want to transition at some point over to the public soon, so Joe, it's over to you.

MR. JOE CIMINO: I just want to say that I'm in support of this for all the reasons mentioned. I am a little bit surprised by all the concerns, but I'm just going to hope that this motion passes, and that we can address some of those in the future. You know I think a lot of states have a public process in place to deal with the federally managed species. I'm a little surprised by all of NOAA's concerns on this, but I'll address that more if this motion passes, and I certainly hope it does.

CHAIR GARY: Toni, in the spirit of hopefully folks on the Board who haven't had a chance to talk here at the meeting, or if somebody needs to add something to this. I'll ask you one more time if there are any Board members that have their hands raised, and then we'll give it over to the public.

MS. KERNS: There were a couple of souls that put their hands down, but we still have three. I have John McMurray, Bill Hyatt, and Emerson Hasbrouck.

CHAIR GARY: Okay, I'm going to honor all three, but John McMurray, no offense to you, I'm going to go ahead and let Bill Hyatt go first, and then Emerson, because we haven't heard from them in this meeting yet, if that's okay. I'll go to Bill Hyatt first.

MR. BILL HYATT: I'll be quick. I just want to say that I very much support this motion, and I don't really share some of the concerns, maybe not to the degree that others have expressed about loss of opportunity for public input, if this is put in place. I'm not so concerned, because of the very specificity of this option and of this motion, and because any application will fall very, very shortly afterwards, following the public input that we're going to get on the Amendment. Support it, and don't have great concerns over not having immediate public input, should we need to implement it.

CHAIR GARY: I'll go to Emerson now.

MR. EMERSON C. HASBROUCK: I certainly support this motion. This motion is just to get this into the public hearing document. It's not like we're taking final action on this component being a final entity in Amendment 7. Let's get it out to the public, and the public will certainly tell us if they would rather have us have the ability to act quickly, with not a lot of public input, or go the more traditional route of an addendum that's going to take a little bit longer, but provide more public input.

CHAIR GARY: Last but not least, back to you, John McMurray.

MR. McMURRAY: I'll be very brief, because I think Emerson just covered most of what I wanted to cover. A great majority of the public comment up to now has been clear that we need to act sooner rather than later, and this offers a tool in the tool box to do that. I think we'll hear a lot of support for it when we go out to public with Amendment 7. I'm in support and that's it.

CHAIR GARY: Toni, I'm going to go ahead now and we'll swing over to the public. I think the best way to handle this will be, let's get a show of hands from those folks in the public that would like to make a comment. Based on the number that we receive, we may have to adjust the time allotment, but I'll let you see how many hands go up.

MS. KERNS: I'm just going to give one more second. Unless I see your hand go up, I'm going to consider, we have four people, and I'm going to cut it at those four.

CHAIR GARY: Okay, thank you, Toni, and to save time I'm going to let you call them, if you don't mind, in the order that you see fit. For those four public members, if you could keep your message very short, a minute or less if possible.

MS. KERNS: Okay, Patrick Paquette.

MR. PATRICK PAQUETTE: Patrick Paquette, Massachusetts Striped Bass Association, and a member of the AP. I very much appreciate this motion by my home state of Massachusetts. As a member of the AP, I struggled with the protection for protecting those three-year classes, because in the back of my head I said, the assessment is going to come out, and we're going to need a reduction.

That seems like that that is plain as day to me, from looking at all the information that I follow. I appreciate getting this out to the public now. I believe that this cuts the timeline, as explained, and I believe that including it in the draft amendment. I believe that the AP will have the ability to comment on the draft amendment. I know that the organized recreational public has many leaders that are on it, and ready to submit letters, and organize people to submit letters. I believe there will be a level of public input. I very much appreciate the ASMFC

even considering, basically shifting into a faster gear than normal, and I support the motion. Thank you.

CHAIR GARY: Thank you very much, Patrick, I appreciate that. Who's next, Toni?

MS. KERNS: Taylor Vavra.

MR. TAYLOR VAVRA: I just very quickly wanted to say that I think the angling public has made it clear that they want decisive, corrective action. We feel that Mr. Armstrong's motion is consistent with that feedback. On behalf of our members of Stripers Forever, and given the boundaries outlined by the motion. It's a one-time measure, that we support this motion, and think this is a good move. It puts us ahead of the game in some ways, so just wanted to say that. Thank you.

CHAIR GARY: Thank you, Taylor, and who do we have next, Toni?

MS. KERNS: Charlie Witek.

MR. CHARLIE WITEK: I feel very comfortable to say that I think I'm speaking for the 3,000 plus people that commented on the Public Information Document last spring, and often raised the issue of delay, that this is the kind of decisive, prompt action that we want to see from the management board, and I expect it will get wide support.

CHAIR GARY: Thank you, Charlie, and I think we have one more, Toni.

MS. KERNS: Phil Zalesak.

CHAIR GARY: Go ahead, Phil.

MS. KERNS: Again, Phil, I still haven't been able to hear you, so you are still not connected via audio. I apologize. I think, Marty, you've got to move on.

CHAIR GARY: Yes, I think we're going to go ahead and move on. Phil, I apologize. We're trying to do everything we can. Maybe we can work with you in the future ahead of time, to make sure we can help you out even better. All right, so we'll bring this back to the Board, and I'm going to go ahead and well, let's give it a try. I'll try to see if we can do this by consent. Is anyone on the Board in opposition of this motion?

MS. KERNS: I have no hands up in opposition.

CHAIR GARY: Then the motion passes by consent. All right, and then Emilie and Toni, help me. But I think we have two more sections to go through. But before we do that. This was one discussion, I would like to ask the Board if there are any other considerations, discussion, concerns they have related to that particular section, or are we okay to move on? If so, raise your hand. If we don't see any hands, we're going to have Emilie move on to the last two sections.

MS. KERNS: I Have Justin Davis, followed by Mike Luisi.

CHAIR GARY: Okay, we're not quite there yet, so Justin, we'll go with you first.

DR. DAVIS: I just wanted to clarify that this point Section 4.2.1 is still in the document, and would go out for public comment, unless we take some action at this point.

CHAIR GARY: Emilie, is that accurate?

MS. FRANKE: Yes, Mr. Chair. Unless action is taken, those measures to protect the year classes are still in the document at this point.

DR. DAVIS: Follow up, Mr. Chair.

CHAIR GARY: Yes, go ahead, Justin.

DR. DAVIS: I would be willing to make a motion to that effect, but I would defer to Mike Luisi first, since he had his hand up, if he's got a comment.

CHAIR GARY: Okay, go ahead, Mike Luisi.

MR. LUISI: No, go ahead, I had the same question, Justin. I wanted to make sure that the PDTs evaluation of Section 4.2.1 was discussed, and if you

have a motion, I would say go for it. I didn't have on planned, but I did want to discuss where we go with that section, thanks.

CHAIR GARY: Back to you, Justin.

DR. DAVIS: Given that, I would move to remove Section 4.2.1 Measures to Protect Strong Year Classes (Recreational Size and Bag Limits) from Amendment 7.

CHAIR GARY: Thank you, Justin, and we'll look for a second.

MS. KERNS: I have David Borden.

CHAIR GARY: All right, seconded by David Borden, and go ahead, Justin, if you want to provide your rationale.

DR. DAVIS: I'll try to keep it brief. I think we've already had a pretty good discussion around this. I agree with the PDTs recommendation that we should remove this from the Amendment. It's clear based on the projections that were done that these options will not provide a benefit to stock rebuilding, which was the rationale for taking a look at this.

I certainly can appreciate the rationale for having added this into the Amendment, and taking a look at this. But given that at this point there is no evidence that these measures will assist us with stock rebuilding, also the noted challenges around the timing with the stock assessment coming out later this year. Also, given the motion that we just passed for the new process, by which the Board will have the option to take quick action later this year, if we should get a result from the stock assessment that indicates we're not on track for rebuilding. I think at this point, I feel pretty safe recommending that we remove this from the document.

CHAIR GARY: David, as a seconder do you have anything to add to that?

MR. BORDEN: No, other than I agree with all of Dr. Davis' comments, and I won't reiterate those points, thank you.

CHAIR GARY: Thank you, David. I remain very sensitive to the public's perspectives, and we've heard a good bit of that captured in the previous dialogue. But I would put it out this way. If there are any members of the public that have strong opposition to this motion, could you please raise your hand, I would like to hear from you.

MS. KERNS: I have one member of the public, Mike Plaia.

CHAIR GARY: Go ahead, Mike.

MR. MICHAEL PLAIA: Yes, thank you. My name is Mike Plaia, I'm on the AP. I'll reiterate what I said at the AP. Katie's analysis did not show an effect on SSB, because she assumed that F remained the same, and that there was no benefit of having larger, more viable fry. I think the only way we can be sure about what the impact is on angler effort and catch, would be to send this out to the public and hear what they have to say. I'm not saying that it's a bad idea or a good idea, I just want to hear from the public.

CHAIR GARY: All right, thank you, Mike, I appreciate that. Toni, is there anyone else that raised their hand that has opposition to this?

MS. KERNS: I have one other individual, and that is Andrew Reichardt.

CHAIR GARY: Go ahead, Andrew.

MR. ANDREW REICHARDT: Hi, Andrew Reichardt, I'm from Flyfishers International. I'm not actually voicing opposition, as much as just confusion. I'm a member of the general public, and the VP of conservation for our organization. I'm sort of unclear what this motion would accomplish, and that's just to give you a perspective from the general public is, I think it's a little bit too granular for someone kind of coming in as a lay person to really grasp what this motion would do.

CHAIR GARY: Emilie, do you want to try to attempt to answer Andrew's inquiry, just in a broad sense?

MS. FRANKE: Sure, Mr. Chair. This motion would remove the options that are currently proposed in Draft Amendment 7 to change the recreational size and bag limits. The Draft Amendment currently proposes a couple different options for the ocean and the Bay for changing the recreational size and bag limits. If this motion is approved, those options would be removed from the document, so the public would not have an opportunity to comment on those options, and Draft Amendment 7 would maintain the current management measures that are in place.

MR. REICHARDT: Thank you, Emilie, and thank you Mr. Chairman.

CHAIR GARY: You're welcome, Andrew. No others, Toni?

MS. KERNS: No other members of the public. You do have Mike Luisi. I don't know, Marty what you want me to do. Now I've had additional members of the public raise their hand. I don't know where.

CHAIR GARY: I think we're going to go ahead and bring this back to the Board. We are at 4:30, and we still have two sections to go. We've had pretty extensive dialogue on it already. Let's, I tell you what, Mike, go ahead if you can keep it brief, and then I want to bring this back for a vote, please. Mike Luisi.

MR. LUISI: I'm sorry, Mr. Chairman, I had my hand up from before, sorry about that.

CHAIR GARY: Let's take it back to the Board then. Again, I'll try this to see if we have consensus. Is there anyone on the Board who is in opposition to this motion, raise your hand.

MS. WARE: Request for a 30 second caucus, please.

CHAIR GARY: Okay, Megan, so we'll go with 30 second caucus, if you could set the timer, Toni, and we'll come back. Okay, we're back, and thank you, Megan, I didn't mean to be presumptuous. Thank you for asking for that. I will try now again via consent. Is there any opposition to this motion?

MS. KERNS: We have one hand up in opposition, the state of Maine.

CHAIR GARY: Okay, so then we have to come back to a formal vote. All right, so Toni, we'll go ahead and call the question. This motion is to remove Section 4.2.1 Measures to Protect Strong Year Classes (Recreational Size and Bag Limits) from Draft Amendment 7. Motion by Dr. Davis, second by Mr. Borden. All in favor, please raise your hand.

MS. KERNS: Just letting the hands settle. I have New Jersey, New Hampshire, Pennsylvania, U.S. Fish and Wildlife Service, Connecticut, NOAA, District of Colombia, Massachusetts, Maryland, New York, Delaware, Virginia, Rhode Island, North Carolina and Potomac River Fisheries Commission. I will put the hands down for everybody. I'm ready.

CHAIR GARY: All those opposed to this motion, please raise your hands.

MS. KERNS: Maine.

CHAIR GARY: Thank you, Toni, I think that's all the votes, do we need to call for null or abstentions?

MS. KERNS: I believe you are correct, so no.

CHAIR GARY: The motion passes 15 to 1.

MS. FRANKE: That's correct, Mr. Chair.

CHAIR GARY: Thank you, Emilie, all right. We're still on this particular section. Emilie has two more to cover, and I'll just ask the question one more time from this particular section on the year class options and rebuild. Are there any other issues that we need to discuss, otherwise we'll move on to the last two items?

MS. KERNS: I have no additional hands. Emilie, you are clear to go ahead on these last two sections.

MS. FRANKE: Sounds good, thank you, Mr. Chair. These final two sections are Section 4.2.2, which is Measures to Address Recreational Release Mortality and Section 4.6.2, which is Conservation Equivalency. As Mr. Chair mentioned, these are the final two sections with proposed options in Draft Amendment 7 that we have not already covered.

Starting with recreational release mortality. Release mortality in the recreational fishery is a large component of annual fishing mortality. It was the largest component from 2017 through 2020, and the striped bass fishery is predominately recreational, with most of the catch released alive. As a reminder, the current management program primarily uses bag limits and size limits to constrain harvest, and is not designed to control effort.

This makes it difficult to control overall fishing mortality. Efforts to reduce fishing mortality through harvest reductions may be of limited use, unless release mortality can be addressed. There are four sets of options in this section. In addition to the Option A, which is status quo circle hook requirement that was implemented through Addendum VI, the Board could consider one or more of the following types of options to address recreational release mortality.

Option B is Effort Controls, which are seasonal closures. Option C is Gear Restrictions, and Option D is Outreach and Education. The status quo option here, Option A, is the circle hook requirement implemented through Addendum VI, and this requires circle hooks when fishing recreationally with bait for striped bass.

This requirement does not apply to any artificial lure with bait attached. Currently there is guidance on incidental catch of striped bass as follows. It is recommended that striped bass caught on any unapproved method of take must be returned to the water immediately without unnecessary injury.

Option B is Seasonal Closures, and this could be selected to be implemented along with the status quo Option A. Seasonal Closures are intended to reduce the number of live releases, by reducing the number of fishing trips or effort that interact with striped bass. The majority of options in the Draft Amendment are no targeting closure options that were developed by the PDT, and this is in order to address releases resulting from both harvest trips and catch and release fishing trips. Estimating the reduction in removals from a no targeting closure depends on assumptions about changes in angler behavior, and this is highly uncertain. For future management actions the PDT recommends that the TC discuss and potentially establish a standardized method for estimating the reduction in removals associated with no targeting closures.

As far as the options themselves. Option B1 under Seasonal Closures are state specific two-week closures, and these closures would be no targeting closures. All recreational targeting of striped bass would be prohibited for a minimum of a two-week period. This is intended to reduce effort during times when the fishery is active in each state.

Under Sub-Option B1-A, each state's closure would need to occur during a wave with at least 15 percent of the state's annual directed stripe bass trips, and that's provided in Table 10 in the Draft Amendment, and those calculations were based on MRIP directed trip data from 2017 through 2019.

Sub-Option B1-B would require each state's closure to occur during a wave with at least 25 percent of the state's annual directed striped bass trips. For these options CE would not be permitted. If the Board selected one of these closure options under B1, the Board would also need to consider Tier 1 listed here, to determine whether existing no targeting closures implemented in 2020 through Addendum VI CE, would or would not meet the requirement of these new closures.

Under Option A, those existing no-targeting closures implemented in 2020 would fulfill the new closure requirements. Under Option B, those existing no targeting closures would not fulfill the requirements, and so those states would need to either implement additional closures, or implement the FMP standard size limit.

Under Option B2, B2 considers spawning closures, and this could be selected in addition to closures under B1 or independent of Option B1. These spawning area closures could contribute to stock rebuilding by eliminating harvest, and/or reducing releases of spawning and pre-spawn fish. For these options, existing spawning closures would be applied toward meeting the requirements of whichever sub-option is selected.

B2-A would require a no harvest closure during Wave 1 and Wave 2 in spawning areas. B2-B would require a no targeting closure for a minimum of two weeks on the spawning grounds, so not necessarily the entire spawning area, but on the spawning grounds during a two-week period in Wave 2 or 3, to align with peak spawning in that state.

For these options again, CE would not be permitted. Moving on to Option C, Gear Restrictions. Again, in addition to the status quo circle hook requirement, the Board could consider additional gear restrictions. Option C1 would prohibit the use of any device other than a non-lethal device to remove a striped bass from the water or assist in releasing a striped bass. The Draft Amendment does include a definition of a non-lethal device. Option C2 would require that striped bass caught on any unapproved method of take would be returned to the water immediately without necessary injury. As a reminder, this incidental catch provision is currently included as recommended guidance in Addendum VI, so selecting this option under Amendment 7 would make this incidental catch provision a requirement. Then finally Option D is related to Outreach and Education. States have already implemented Outreach and Education campaigns related to circle hooks and related to best handling practices, as encouraged by Addendum VI. These options are intended to more explicitly recognize those efforts as part of Amendment 7.

D1 would require states to promote best handling practices, and states would be required to provide updates on these outreach efforts in their annual compliance reports. Under D2 it would be recommended that states continue to promote these best handling and release practices. As I mentioned at the beginning of the presentation, the Law Enforcement Committee met in December, 2021 and briefly discussed these proposed options to address recreational release mortality in Draft Amendment 7.

They noted the following in their discussion. The first is there was concern that no targeting closures would be unenforceable. There was support for making the incidental catch provision a requirement. It was recommended to conduct outreach to manufacturers to continue addressing questions about what qualifies as a circle hook.

The LEC noted the overall importance of regulatory consistency, particularly for shared waterbodies. The LEC also noted that any spawning area closures should be clearly defined. For example, clearly defining whether the closure is in major spawning rivers or minor spawning rivers or both.

I'll move on now to the Conservation Equivalency options, and then I will pause for questions. The statement of the problem for the Conservation Equivalency section notes that there is value in allowing states to implement alternative regulations, based on the needs of the fisheries. But this creates regulatory inconsistency among states, and this comes with associated challenges such as enforcement challenges with these regulatory inconsistencies.

It's also difficult to evaluate the effectiveness of CE programs once they're implemented, due to the challenge of separating the performance of the measures from other variables, like changes in angler behavior, or changes in fish availability. There have also been some concerns raised that some of the alternative measures implemented through CE could potentially undermine management objectives.

Finally, there is limited guidance on how and when CE should be pursued, and how exactly equivalency is defined. Option A is the status quo, and Options B through E in this section consider whether to adopt new default restrictions or requirements for the use of CE. Any sub-option selected under B

through E would automatically apply to any new FMP standards approved through Amendment 7, and all subsequent management actions and CE proposals.

Again, Option A is status quo. The Board currently has final discretion regarding the use of CE and approval of CE programs. The Board can restrict the use of CE on an ad hoc basis for any FMP requirement. Potential restrictions could include specifying measures that are not applicable for CE, or the Board could limit the range of measures that may be proposed through CE. Again, currently the Board does have discretion on the use of CE. Option B would establish default restrictions on the use of CE for certain fisheries, depending on the status of the stock. When these stock conditions are met, CE programs would not be approved, based on whichever option is selected. It's important to note here that any previously existing CE programs would remain in place until Board action is taken to change those FMP standards.

The first set of sub-options here is B1, and this considers what those restrictions would be. B1-A would not allow CE if the stock is overfished. B1-B would not allow CE if the stock is below the SSB target, and the Board could choose either B1-A or B1-B. Then in addition to those, or exclusive of those, the Board could select B1-C, which would not allow CE if overfishing is occurring.

The next set of sub-options, B2 considers the applicability of any restrictions that are selected under B1. Most of the concerns surrounding CE that were identified during the scoping and PID process for Draft Amendment 7, were related to non-quota managed fisheries, due to uncertainty in MRIP data, and challenges with measuring the effectiveness of CE programs.

At a minimum, any restrictions selected under B1 would apply to non-quota managed recreational fisheries, which would include the Chesapeake Bay trophy fishery. The restrictions would not automatically apply to the Hudson River, the Delaware River and the Delaware Bay fisheries. Under Option B2, the Board could choose to extend those default CE restrictions, to apply to one or more additional fisheries.

The Board could choose to extend those restrictions to the Hudson and Delaware fisheries. The Board could extend those restrictions to quota managed recreational fisheries, so extend those restrictions to bonus programs, and/or the Board could extend those restrictions to apply to commercial fisheries.

The next set of options, Option C would establish default precision standards for MRIP catch and effort estimates used in CE proposals. These options are based on the percent standard error, or PSE associated with MRIP estimates. C1 would not allow CE proposals to use MRIP data with a PSE exceeding 50.

For C2 the PSE could not exceed 40, and for C3 the PSE could not exceed 30. The next set of sub-options, Option D would establish a default uncertainty buffer for CE proposals for non-quota managed fisheries. This uncertainty buffer is intended to increase the probability of success in achieving equivalency to the FMP standards.

Option D1 would require an uncertainty buffer of 10 percent for CE programs. D2 would require a buffer of 25 percent. D3 would require a buffer of 50 percent. Then finally Option E considers establishing a definition of what equivalency means for CE proposals for non-quota managed fisheries. These options are intended to specify the percent reduction or liberalization that must be met with a CE proposal. In the case where the FMP standard is projected to have different effects at the coastwide versus the state-specific level.

Proposed CE programs would be required to demonstrate equivalency to either Option E1, which would be equivalency to the percent reduction projected for the FMP standard at the coastwide level. For example, this was their requirement for Addendum VI, that each state was required to achieve an 18 percent reduction, which is the same reduction that was projected coastwide.

Under Option E2, proposed CE programs would be required to demonstrate equivalency to the percent reduction for the FMP standard projected at the state level. That's all I have, Mr. Chair on recreational release mortality and conservation equivalency. I am happy to take any questions.

CHAIR GARY: All right, thank you, Emilie. We go back to the Board, and again emphasizing what our intentions are, in terms of whether we're going to leave things as they are, or whether we're going to modify the narrative or remove it. We'll now move to questions for Emilie, and any discussion. We'll start with questions first, so Toni, any Board members have questions on these two sections?

MS. KERNS: I have two members with their hands up, John McMurray and Justin Davis, and one more, Emerson Hasbrouck.

CHAIR GARY: Okay, John.

MR. McMURRAY: A quick question on the spawning area closures. The Draft isn't clear on what constitutes a spawning area. I'm sure plans would vary greatly, depending on how far down in the watershed it would go. I think that it probably should be clear in the document, so people know exactly what they're commenting on. I guess where in the process would we clarify that?

MS. FRANKE: Thanks for the question, John. I think perhaps we could potentially reach out to the states. What I will say is that Amendment 6 includes a recommendation for states to implement spawning area closures. That recommendation in Amendment 6 lists those spawning areas pretty generally, which is how they are listed in Draft Amendment 7. I think from the PDTs perspective, we didn't talk about specific boundaries for those closures, more that the states would determine where those spawning areas are, to implement those closures.

CHAIR GARY: Did that answer your question, John, do you need a follow?

MR. McMURRAY: It did, so there are guidelines or some sort of map in the Amendment 6 recommendations we could direct people to? Is that what I heard?

MS. FRANKE: No. There is no specific map or specific boundaries listed. Amendment 6 just lists the spawning areas themselves, and then left it to the states to determine those exact boundaries. I might turn to Toni, if she has any thoughts on the Commission specifying where spawning closure boundaries would be, or if that would be a state decision.

MS. KERNS: Thanks, Emilie. If it were a state decision, we would just need to specify that the state would determine the spawning areas in the document so the public knew that. Otherwise, we would have to define the spawning areas within the document itself. Bob, I don't know if you have another possibility, or refer to another document. I mean we could just take what was in Amendment 7, I guess, and put it into this document. But I'll go to Bob for any other ideas.

EXECUTIVE DIRECTOR BEAL: Yes, Marty, I'll chime in. I don't have anything else to add, it just needs to be defined somewhere, either through this document or leave it up to the states, and the states will have to provide probably a definition for review by the Technical Committee and the Board as part of their implementation plan, if this option is selected.

CHAIR GARY: John, any last thoughts? Does that answer your question to satisfaction or not?

MR. McMURRAY: It doesn't really, to be honest. You're going to get a lot of feedback from the public, I'm sure, because they don't. I mean to tell them what the spawning area closure would be after they comment on it, or after we maybe approve it, I think, is not really the right way to go here. But it doesn't sound like there is any good solution, so I'll just leave it at that.

CHAIR GARY: It's an interesting discussion. In the Chesapeake the spawning rivers, areas and reaches

are pretty well defined by the two states. PRFCs jurisdiction is defined in Maryland COMAR. I can't speak for other states and other jurisdictions. Emilie and Toni, to address John's concern, is that something we can do outside of a motion, to try to help clarification for the public? Just trying to see if we can address his concern.

MS. FRANKE: Toni, I'll just jump in. I think from the PDT perspective. I think I would propose deferring to the states to define those areas. I don't know if, from Toni's perspective, if those definitions would be in this Draft Amendment, or if it would be just deferring to the states to implement those closures to cover the applicable spawning areas.

MS. KERNS: I think, and to add on to that, Marty. I think what we could do is in the document we would say, for states that have spawning areas defined, we would use those spawning areas as defined by the state. For those that do not, if this option were approved, states would have to define those and bring them back to the Board as part of their implementation plan.

CHAIR GARY: John, does that's help a little bit? For me at least it seemed to add some clarity.

MR. McMURRAY: It does. I'm not going to take up any more of the Board's time on it.

CHAIR GARY: Next, we'll go to Justin Davis.

DR. DAVIS: My question is, if the Board takes final action on this Amendment in, let's say May, and ops to approve one of the options under Section 4.2.2 under one of the no targeting closure options and/or the spawning closure options, and also votes to add the sort of one time only specifications process to the tool box.

Then we get a not great result from the stock assessment in October, and decide to use that specs process. Will the potential savings that are going to be achieved through implementation of those no targeting or spawning area closures in 2023, will those need to be taken into account, when the Technical Committee determines what measures are needed to achieve whatever reduction we have to achieve, to get back on the rebuilding timeline?

MS. FRANKE: Because there is no standardized method established to calculate the percent reductions achieved by no targeting closures at this point. I would assume that those closures may not be incorporated into that calculation of achieving a reduction. Again, I'll defer to Katie if she thinks otherwise, but at this point I don't anticipate that being possible.

DR. DREW: I think it be, if we did do it, it would probably be along the lines of something more like a sensitivity analysis, because obviously the issue with some of these closures is, what happens to all of those trips where fish were released? Do those trips still happen or not? Sort of the maximum reduction you would expect is that everybody who released a fish gives up and goes home, or everybody who caught a fish before, you know none of those trips happened.

Versus everybody just switches to catch and release and it doesn't change effort at all, and so we would probably look at some of the bounds on potential reductions that you would expect to help us understand the full potential of reductions with these measures, and then provide that information to the Board, to help them assess how conservative or risky they want to be with some of their assumptions about what reductions would be, due to these programs where again, we don't have a really good way of answering some of these questions.

CHAIR GARY: Justin, do you have any follow to that, or are you satisfied?

DR. DAVIS: Just a quick follow up. I saw language on a slide that said the TC will need to develop a standardized method for estimating removals achieved by no targeting reductions. I took that to mean that at some point the TC will need to develop a way to assign a number to what level of removals we can achieve with no targeting closures. Is what being said here that we're just not going to

be ready to do that before October, 2022, or is just that we're never really going to be able to do that?

DR. DREW: It will probably be, we'll have to see how, especially if the TC is going to be tasked with developing options for Board specifications to be at the Board with the assessment. That would certainly cut into our time to be able to do this by October 2022. But I think there is also the issue of the standardized method may end up just being, here's a range of possible reductions, to give you a sense of the uncertainty with these, rather than here is the right number. I think we would need more data down the line to see how these closures actually impact effort and angler behavior, in order to get to something a little more certain down the line.

DR. DAVIS: Okay, thank you.

CHAIR GARY: All right, so we had one more, Emerson, and I'll turn it over to him. But before we do that, we're at five o'clock now, so I would ask other Board members. Unless your question is really critical, Emerson would be the last question. But if you really do feel like you have a compelling question you need to have answered, go ahead and put your hand up and I'll turn to Toni, and then we'll switch to discussion and see whether or not we're going to have any structural modification or removal of any of the narrative, and go from there. Over to you, Emerson.

MR. HASBROUCK: Thank you, Emilie, for the great job you're doing in leading us through this document today. The question I had is actually relative to the answers to Justin's question that he just asked. In the document under Section 4.2.2, right there is a note on estimating reduction and removals.

Estimating the reduction and removals from a non-targeting seasonal closure depends, I'm not going to read the whole thing. Essentially, that note says that the PDT recommends the Board task the TC to establish such methods in advance of implementation of subsequent management actions. The TC may need guidance from the Board on this task.

I'm just wondering, when the PDT is looking for the Board to task the TC to establish such methods. As Justin said, the way it is now, is this what's going to, you know it's in the document but it's going to never be utilized, because we don't have a method to estimate the reduction and removals? When is it that the PDT is looking for the Board to task the TC, so that this can move forward?

MS. FRANKE: From the PDTs perspective, I think this recommendation was a little bit more long term in that, potentially after Amendment 7 is implemented for any subsequent addendums, it would be beneficial for the TC to have this discussion about no targeting closures, and the estimating the reduction in removals, because through this Amendment it's clear that there is some Board interest in pursuing no targeting closures as a potential management tool.

Coming into Amendment 7, the PDT was not trying to achieve a specific reduction with these Amendment 7 closures. However, the PDT recognized that given the interest in these closures as a management tool, that for any subsequent actions after Amendment 7, it would be beneficial for the TC to have this discussion. I think as Katie mentioned, in the near term I think the focus will be on the assessment. But I think potentially after the assessment that could be a task for the TC, so that any future management actions would have that behind them.

MR. HASBROUCK: Follow up, Mr. Chairman?

CHAIR GARY: Please, if you can keep it short, Emerson.

MR. HASBROUCK: Yes, I'll try to. Does that mean if some of the options, some of the components of Option B under 4.2.2, Effort Control and Seasonal Closures, or Seasonal Requirements? If those are included in the final adoption of Amendment 7, we're not really going to do anything with those? You're just going to kind of languish until we direct

the PDT, or we direct the TC to establish some methods, in terms of estimating removals? Am I following this correctly? Even if it's in there we're not going to do anything with it for a while?

MS. FRANKE: If those, oh go ahead, Toni, sorry.

MS. KERNS: I was just going to try to help out on this, Emerson. The PDTs recommendation for these is not specific to how much you've removed. They were trying to get at ways to lower recreational release mortalities. There wasn't a specific percentage that we're trying to achieve.

For this document itself, in essence, it's not like an addendum where you're trying to achieve a certain percent reduction. It's not necessary for this document, but as Emilie said, for future if you're trying to use it as a tool to achieve a certain reduction, then the TC is going to have to try to figure something out.

MR. HASBROUCK: Okay, thank you. The note that's in this Amendment about the Board tasking the TC to establish its methods is not appropriate at this time; that will be something in the future?

MS. FRANKE: Yes, I think that task was intended as a task following implementation of Amendment 7.

MR. HASBROUCK: Thank you.

CHAIR GARY: I am aware that one other person, I must have missed it, had his hand raised, it's Dave Sikorski. I'm going to go ahead and turn it to Dave. That's going to be the last question. Then I'm going to ask the Board. You know if functionally there is a desire to modify or remove any of the narrative language, let's have that discussion. If there is not, I think we'll be looking to move this to fruition. I'll go ahead and turn this over to Dave Sikorsky, and then come back and ask the question if there are any actual adjustments we want to make. Go ahead, Dave.

MR. SIKORSKI: My focus is on Figures 4 and 5 under the spawning closure component. To me, I think there might be a small error on the Maryland piece in December. The season closes in the end of December, it's not a no targeting provision. Just a note. Then the request would be consistent with the request from last meeting, which I think fell through the cracks, and it relates to providing the public and the Board a better way to show us where fisheries are persecuted on spawning stock fish.

I think this makes sense. While I recognize this document is largely focused on recreational measures, I think just the simple addition of commercial fisheries on spawning stock fish, and how they lay out amongst the year, would be really helpful, and mostly because we're looking at a composite F.

We're looking at a coastwide stock we're trying to manage, and a fishing mortality that's all sources of mortality. To me, it's really helpful to understand when these spawning fish are prosecuted by a fishery, not just the recreational one. Well, I guess my question is can that be added?

MS. FRANKE: I think if you could just give a little bit more clarification of what you're looking for. Are you looking for sort of understanding when the commercial seasons for different states, and sort of trying to apply that to when spawning fish are potentially available to the fishery?

MR. SIKORSKI: Yes, spawning stock biomass.

MS. FRANKE: Okay, I can follow up with you after the Board meeting if that's helpful. As you mentioned, this section is focused on the recreational fishery. Perhaps we can add something additional to the appendix, to summarize those commercial seasons, if that would be okay with you.

MR. SIKORSKI: That would be great, thank you.

CHAIR GARY: All right, thank you, Dave. Now I'm going to shift this back to discussion and any potential action for this section. I keep thinking of October 2014, when we were in Mystic, Connecticut. We had I think almost a 10-hour meeting, and I do not aspire to prolong this meeting

to the point where everyone is having trouble functioning.

I guess the question now before the Board is, you have these two sections, we've gone through it, asked questions. Are there any modifications, deletions? Is there anything structurally that we want to adjust here, and if so, if we want to do that, let's have a discussion and show of hands. If there is not, then I think maybe we're in a position to bring the Amendment to fruition, and approve it. But Toni, we'll see if you get a show of hands of any kind that want to adjust anything in these two sections.

MS. KERNS: I have Roy Miller.

CHAIR GARY: Yes, Roy.

MR. ROY W. MILLER: If I may, very quickly, a correction since David Sikorski brought it up. If you look on Figure 5 under spawning area closures, it shows Delaware Bay as being the spawning area in Delaware. It is not classified as a spawning area in Delaware. The Delaware River is, not Delaware Bay, so just a quick correction, thank you.

CHAIR GARY: No, thank you, Roy, I appreciate that. Toni, did anyone raise their hands to signify that they want to move in the direction to discuss possible modifications?

MS. KERNS: I have two hands, Tom Fote and Emerson Hasbrouck.

CHAIR GARY: Okay, Tom, go ahead.

MR. FOTE: Yes, Marty, I'm not saying that we should discuss this any further. What I'm saying is that we're going out to public hearings, we've got a document. We've worked on this document continuously, at least four meetings. We should just go ahead, put it to bed and let it go out. Because we're going to discuss this to death when it comes back anyway. I'm comfortable sending this document as is right now.

CHAIR GARY: Okay, thank you, Tom. Emerson, did you have another comment?

MR. HASBROUCK: No, I didn't. You know I was getting a sense that there wasn't going to be any motions here to change these two sections, so I was ready to make a motion to accept this to send it out to public hearing, if you're ready.

CHAIR GARY: We, I believe, are ready, Emerson, so I'll go ahead and allow you to entertain that motion.

MR. HASBROUCK: Does staff have a motion prepared, okay, so move to approve Draft Amendment 7 for public comment as modified today.

CHAIR GARY: Thank you, Emerson, do we have a second to the motion?

MS. KERNS: I have Justin Davis.

CHAIR GARY: We have a motion to approve Draft Amendment 7 for public comment as modified today, a motion by Mr. Hasbrouck, second by Dr. Davis. Toni, do we want to have a full vote on this, or is okay to see if we can do this by consent?

MS. KERNS: You can ask for opposition. That's fine.

CHAIR GARY: All right, so I'll ask the question. Is there anyone on the Board who is opposed to this motion, raise their hand.

MS. KERNS: I have no Board members with their hand up.

CHAIR GARY: Okay, Toni, you said there are no hands up.

MS. KERNS: That is correct, Mr. Chair.

CHAIR GARY: Thank you, Toni, thank you Board members. The motion passes by unanimous consent and Amendment 7 is approved to go out for public comment, so thank you all for your hard work.

OTHER BUSINESS

We are toward the end. We are at Other Business. My ear buds died; they ran out of batteries. I think we are at the portion of the agenda for Other Business, and I do have one thing to say before we adjourn. Is there other business to come before this Board today?

MS. KERNS: I see no hands raised.

CHAIR GARY: Okay, then I would just like to say on behalf, hopefully I can speak for the Board, and all the folks that I've been interacting with over the last couple of years, to pour a lot of accolades on all the groups that convened together the Work Group back in 2020. The Plan Development Team, the Technical Committee, all that hard work those many, many meetings. There isn't a single person in the staff and all these groups that doesn't care for this species, and I really believe we're headed in a good direction, we're going to have a good discussion.

But I wanted to thank all of those groups that worked so hard to bring this to fruition, and I want to save the best thanks to Emilie Franke for all of her hard work. It's been an incredible herculean job, Emilie, and you've just been phenomenal. I can't thank you enough, and I think I speak for everyone on the Board and the public and participants, so thank you so much, Emilie, for all your help. With that, I don't believe we have any other business to come before this Board. I'll seek a motion to adjourn.

MS. KERNS: Hey Marty, do you want to just make one quick note, and I echo your comments on the work that all of these committees and commissioners and Emilie have all done. I think I threw Emilie into the lion's den to an extent, as a new staff member, right into the middle of this document, and she's really laying with it and has done an excellent job.

But I just wanted to note, and we talked a little bit about this at the Executive Committee, and I think the conversation will carry at the Policy Board level, just in terms of the timeframe for this document. The Commission has under the charter, it has specific guidelines that we have to follow, in terms of the number of days that the document has to be out, before you can conduct a hearing, and then after your last hearing the number of days that the document has to stay out.

If we get the document out, even on Friday, that timeline is going to be tight for the May meeting. I just want to make sure I set up some expectations for the Board, in terms of when you'll receive comment on this if we stay on the current schedule to have this information come out at the May meeting.

There had been discussions about having like a special Striped Bass Board meeting end of May, early June, possibly, depending on all the different documents that get approved this week, and the number of public hearings that we would need to have, in order to move all those documents through. But if we stay on the regular schedule, it could be that the information that the Board gets will be in pieces, in terms of the public comment on this.

It would be almost impossible for us to provide the summary of public comment on the meeting materials, and there is a high likelihood that a lot of the comments may come at the supplemental materials, if this is a typical striped bass document, where we receive a lot of comments. I just wanted to set that expectation up for the Board and the public, and we will work as hard as we can and as best as we can. But there are certain time constraints that we have via the charter.

CHAIR GARY: Thanks for mentioning that, Toni, and I guess aside from the Charter there is also the complications of the synergy of the other boards, many of which are having public hearings as well, if I'm not mistaken, that aren't going to make it any easier, as well, I guess. Okay, is there anything else from staff perspective, Emilie, Toni, which we need to mention before we adjourn?

MS. KERNS: I don't have any.

ADJOURNMENT

CHAIR GARY: Okay, thank you, I would take a motion to adjourn, if somebody would be kind enough to offer that up.

MS. KERNS: Tom Fote has his hand up.

CHAIR GARY: Motion to adjourn by Tom Fote, do we have a second?

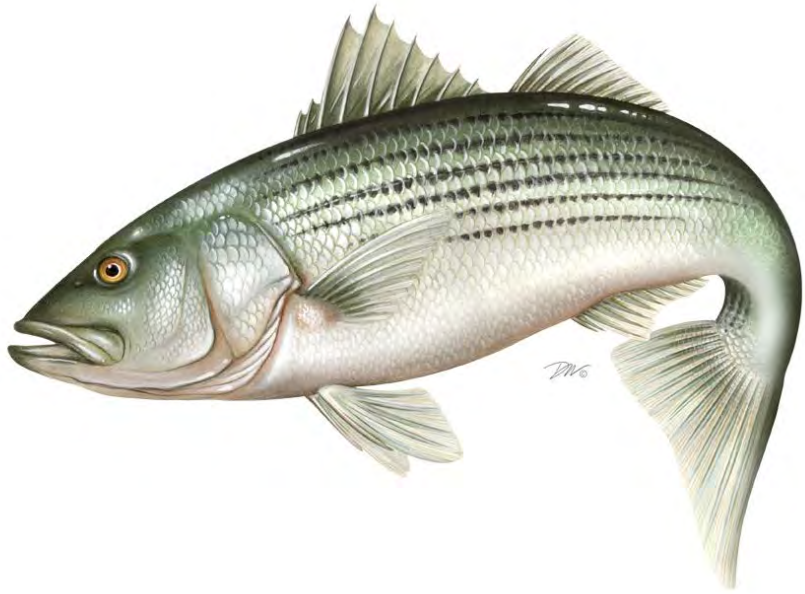
MS. KERNS: Cheri Patterson.

CHAIR GARY: Seconded by Cheri, is there any opposition to that, raise your hand. None, I'm assuming, Toni. The meeting is adjourned, thank you so much for your patience, Board and public. This Amendment is now approved to go out to public comment, and we look forward to everyone's participation in the process.

(Whereupon the meeting adjourned at 5:15 p.m. on January 26, 2022.)

Atlantic States Marine Fisheries Commission

Draft Amendment 7 to the Interstate Fishery Management Plan for Atlantic Striped Bass For Public Comment



February 2022
Updated April 6, 2022 (Figure 4)

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

Draft Document for Public Comment

Draft Amendment 7 to the Interstate Fishery Management Plan for Atlantic Striped Bass

Prepared by

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This is a report of the Atlantic States Marine Fisheries Commission pursuant to U.S. Department of Commerce, National Oceanic and Atmospheric Administration Award No. NAXXXXXX

Draft Document for Public Comment

The Atlantic States Marine Fisheries Commission seeks your input on Draft Amendment 7 to the Atlantic Striped Bass Fishery Management Plan.

The public is encouraged to submit comments regarding this document during the public comment period. Comments must be received by **11:59 PM (EST) on April 15, 2022.** Regardless of when they were sent, comments received after that time will not be included in the official record. The Atlantic Striped Bass Management Board will consider public comment on this document before finalizing Amendment 7.

You may submit public comment by attending a public hearing held in your state or jurisdiction or mailing, faxing, or emailing written comments to the address below. Comments can also be referred to your state's members on the Atlantic Striped Bass Management Board or Atlantic Striped Bass Advisory Panel; however, only comments received at a public hearing or written comments submitted to the Commission will become part of the public comment record.

Mail: Emilie Franke
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If your organization is planning to release an action alert in response to Draft Amendment 7, or if you have questions, please contact Emilie Franke, Fishery Management Plan Coordinator, at 703.842.0740 or efranke@asmfc.org.

The timeline for completion of Amendment 7 is as follows:

August 2020	Board initiated Amendment 7
February 2021	Board reviewed Draft Public Information Document (PID) and approved PID for public comment
February - April 2021	Public comment on PID
May 2021	Board reviewed public comment; directed Plan Development Team to develop Draft Amendment
May - December 2021	Preparation of Draft Amendment
January 2022	Board reviewed and approved Draft Amendment for public comment
February - April 2022	Public comment on Draft Amendment ***Current Step***
May 2022	Board reviews public comment and selects final measures for the Amendment; Policy Board and Commission approve the Amendment

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1.0 INTRODUCTION

The Atlantic States Marine Fisheries Commission (ASMFC), under the authority of the Atlantic Coastal Fisheries Cooperative Management Act, is responsible for managing Atlantic striped bass *(Morone saxatilis)* in state waters (0-3 miles) along the Atlantic Coast. The states and jurisdictions of Maine through North Carolina, including Pennsylvania, the District of Columbia, and the Potomac River Fisheries Commission (PRFC), participate in the management of this species as part of the Commission's Atlantic Striped Bass Management Board (Board). Amendment 7 to the Interstate Fishery Management Plan (FMP) for Atlantic striped bass replaces Amendment 6 (2003) and its Addenda I – VI. Management authority in the exclusive economic zone (3-200 miles from shore) lies with the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS).

1.1 BACKGROUND INFORMATION

Since Amendment 6 was adopted in 2003, the status and understanding of the striped bass stock and fishery has changed considerably. The results of the 2018 Benchmark Stock Assessment (NEFSC 2019) in particular led the Board to discuss a number of significant issues facing striped bass management. The 2018 benchmark stock assessment indicated the striped bass stock has been overfished since 2013 and is experiencing overfishing, which changed perception of stock status. The Board accepted the assessment for management use in 2019; management triggers established through Amendment 6 tripped at that time, requiring the Board to take action to address both overfishing and the overfished status.

In April 2020, the Board implemented Addendum VI to end overfishing. In August 2020, the Board initiated development of Amendment 7 to the FMP to update the management program to better align with current fishery needs and priorities, and build upon the Addendum VI action to initiate rebuilding.

In February 2021, the Board approved for public comment the Public Information Document (PID) for Draft Amendment 7. Public comment was received and hearings were held between February and April 2021. At its May 2021 meeting, the Board tasked the Plan Development Team (PDT) with developing Draft Amendment 7 and provided additional guidance to the PDT at the August and October 2021 Board meetings. In January 2022, the Board approved for public comment Draft Amendment 7 with proposed options to address the following issues:

- Management Triggers (see *Section 4.1* Management Triggers)*;*
- Recreational Release Mortality (see *Section 4.2.2* Measures to Address Recreational Release Mortality)*;*
- Rebuilding Plan (see *Section 4.4* Rebuilding Plan); and
- Conservation Equivalency (see *Section 4.6.2* Management Program Equivalency)*.*

1.1.1 Statement of Problem

1.1.1.1 Management Triggers

The management triggers are intended to keep the Board accountable and were developed at a time when the stock was thought to be at historic high abundance and well above the female spawning stock biomass (SSB) target. However, as perceptions of stock status and fishery performance have changed, shortfalls with how the management triggers are designed have emerged. When female SSB is below the target level, the variable nature of fishing mortality can result in a continued need for management action. The shorter timetables for corrective action are also in conflict with the desire for management stability. As a consequence, the Board is sometimes criticized for considering changes to the management program before the stock has a chance to respond to the most recent management changes. Furthermore, the use of point estimates in decision-making does not account for an inherent level of uncertainty. Lastly, the observed long period of below average recruitment which contributed to recent declines in biomass has raised questions about the recruitment-based trigger and whether it is designed appropriately.

1.1.1.2 Recreational Release Mortality

Recreational release mortality constitutes a large component of annual fishing mortality—the largest component from 2017 through 2020—because the striped bass fishery is predominantly recreational and an overwhelming majority of the catch is released alive, either due to cultural preferences (i.e., fishing with the intent to catch and release striped bass) or regulation (e.g., the fish is not of legal size). Some stakeholders value the ability to harvest striped bass, while others value the experience of fishing for striped bass regardless of whether they are able to retain fish. The current management program, which primarily uses bag limits and size limits to constrain recreational harvest, is not designed to control fishing effort which makes it difficult to control overall fishing mortality. While the acceptable proportion of recreational release mortality in total removals should reflect the management objectives for the fishery, efforts to reduce overall fishing mortality through harvest reductions may be of limited use unless recreational release mortality can be addressed.

1.1.1.3 Stock Rebuilding and Low Recruitment

The Board has expressed concern about recent low recruitment estimates and the potential impact of low recruitment levels on the ability of the striped bass stock to rebuild by 2029. If rebuilding measures are implemented based on the standard recruitment method from the stock assessment but recruitment remains lower than average, the population may not be able to rebuild to the female SSB target by 2029. The next stock assessment update (expected in 2022) will calculate the fishing mortality rate required to rebuild the stock by 2029, and those rebuilding calculations could take into account different assumptions about recruitment.

1.1.1.4 Management Program Equivalency (Conservation Equivalency)

There is an essential tension between managing the striped bass fishery on a coastwide basis while affording states the flexibility to deviate from the FMP standard through conservation

equivalency (CE).[1] There is value in allowing states to implement alternative regulations tailored to the needs of their fisheries; however, this creates regulatory inconsistency among states and within shared waterbodies with associated challenges (e.g., enforcement). It is difficult to evaluate the effectiveness of CE programs and their equivalency to the FMP standard once implemented due to the challenge of separating the performance of management measures and outside variables (like angler behavior and availability of fish). Concerns have been raised that some alternative measures implemented through CE could potentially undermine management objectives. And finally, there is also limited guidance on how and when CE should be pursued, particularly when the stock is overfished and rebuilding is required, and how "equivalency" is defined.

1.1.2 Benefits of Implementation

The status and understanding of the striped bass resource and fishery has changed considerably since implementation of Amendment 6 in 2003. Reevaluation of striped bass management processes, specifically management triggers and conservation equivalency, and consideration of recreational fishery measures to address release mortality will support stock rebuilding and promote the sustainable management of the striped bass resource and fishery moving forward.

1.1.2.1 Ecological Benefits

Striped bass play an important ecological role in coastal marine ecosystems. Managers and stakeholders have expressed interest in the role of striped bass in the ecosystem from both a top-down perspective (as a predator that could affect other species) and a bottom-up perspective (as a consumer affected by prey availability). Young-of-year striped bass feed primarily on small invertebrates, and as they age, they start eating fish and larger invertebrates, including Atlantic menhaden, herring, bay anchovies, blue crabs, and lobster. Striped bass are also preyed on by other species; as young-of-year and juveniles, they are consumed by adult fish like bluefish, weakfish, and even other striped bass. Sustainable management of striped bass will contribute to maintaining a balanced marine ecosystem.

1.1.2.2 Social/Economic Benefits

Rebuilding the Atlantic striped bass population will enhance the economic and social benefits attributable to this population in the ASMFC member states. Economic benefits of a rebuilt stock would include increased use values (e.g., consumptive and non-consumptive use values related to commercial and recreational fishing) and non-use values (e.g., existence values) for current and future generations. There are many potential socioeconomic impacts that could result from changes in striped bass management, notably potential implementation of seasonal closures. These potential changes may result in short-term negative impacts to recreational angler welfare. However, the net positive long-term social and economic benefits stemming

[1] FMP standard refers to a management measure specified in the FMP.

from stock recovery and subsequent catch increases in successive years will likely outweigh the short-term impacts. Potential restrictions on how and when states can pursue CE programs could result in socioeconomic impacts if there is less flexibility to implement alternative regulations tailored to the needs of each state's fisheries.

1.2 DESCRIPTION OF THE RESOURCE

1.2.1 Species Life History

1.2.1.1 Stock Structure and Geographic Range

Atlantic coastal migratory striped bass inhabit estuaries and the Atlantic Ocean along the eastern coast of North America from the St. Lawrence River in Canada to the Roanoke River and other tributaries of Albemarle and Pamlico Sounds in North Carolina (Merriman, 1941). Some individuals from longer river systems within this range may not undergo coastal migrations, but rather restrict their migrations to within the river and estuary (Morris et al., 2003; Zlokovitz et al., 2003). Stocks which occupy coastal rivers from the Tar-Pamlico River in North Carolina south to the St. Johns River in Florida are primarily endemic and riverine and do not presently undertake extensive Atlantic Ocean migrations as do stocks from the Roanoke River north (Richkus, 1990), based on tagging studies (Callihan et al., 2014; Callihan et al., 2015). Striped bass are also naturally found in the Gulf of Mexico from the western coast of Florida to Louisiana (Merriman, 1941; Musick et al., 1997). Striped bass were introduced to the Pacific Coast using transplants from the Atlantic Coast in 1879 as well as into rivers, lakes, and reservoirs throughout the US and foreign countries such as Russia, France, and Portugal (Hill et al., 1989).

The anadromous populations of striped bass on the Atlantic coast are primarily the product of four distinct spawning stocks: an Albemarle Sound-Roanoke River stock, a Chesapeake Bay stock, a Delaware River stock, and a Hudson River stock (ASMFC 1998). The Atlantic coast fisheries rely primarily on production from the spawning populations in the Chesapeake Bay and in the Hudson and Delaware rivers. Historically, tagging data indicated very little mixing between the Albemarle Sound-Roanoke River stock and so that stock is managed and assessed separately from the coastal stock.

The Chesapeake Bay stock of striped bass is widely regarded as the largest of the four major spawning stocks (Goodyear et al. 1985; Kohlenstein 1980; Fabrizio 1987). Recent tag-recovery studies in the Rappahannock River and upper Chesapeake Bay show that larger and older (ages 7+) female striped bass, after spawning, move more extensively along the Atlantic coast than stripers from the Hudson River stock (ASMFC 2004).

Striped bass abundance in the Delaware River, as measured by juvenile seine surveys, rose steadily following pollution abatement during the mid-1980s and peaked in abundance in 2003 and 2004. Like the Chesapeake Bay and Hudson stocks, spawning in the Delaware River begins during early April and extends through mid-June (ASMFC 1990). Recent tagging studies in the Delaware River show that larger and older (ages 7+) female striped bass undergo extensive

migration northward into New England from July to November that spatially overlap the migratory range of Chesapeake Bay striped bass (ASMFC 2004).

1.2.1.2 Age and Growth

Generally, longevity of striped bass has been estimated as 30 years, although a striped bass was aged to 31 years based on otoliths (Secor 2000). This longevity suggests striped bass populations can persist during long periods of poor recruitment due to a long reproductive lifespan. In general, the maximum ages observed have increased since 1995 when the striped bass fisheries reopened. From 1995 to 2016, the maximum observed female age increased from 16 to 31, with the oldest fish caught in Chesapeake Bay, Virginia, in 2014. During the same period, the maximum observed male age increased from 16 to 24 with the oldest fish caught in Chesapeake Bay, Virginia, in 2011.

As a relatively long-lived species, striped bass are capable of attaining moderately large size, reaching as much as 125 pounds (57 kg) (Tresselt 1952). Growth rates of striped bass are variable, depending on season, age, sex, competition and location. For example, a 35 inch (889 mm) striped bass can be 7 to 15 years of age and a 10-pound (4.5 kg) striped bass can be 6 to 16 years old (ODU CQFE 2006). Growth occurs during the seven-month period between April and October. Within this time frame, striped bass stop feeding for a brief period just before and during spawning, but feeding continues during the upriver spawning migration and begins again soon after spawning (Trent and Hassler 1966). Growth rates and maximum size are significantly different for males and females. Both sexes grow at the same rate until 3 years old; beginning at age-4, females grow faster than males. Females grow to a considerably larger size than males; striped bass over about 30 pounds (14 kg) are almost exclusively female (Bigelow and Schroeder 1953).

1.2.1.3 Spawning and Reproduction

Atlantic striped bass are anadromous, meaning they spend most of their adult life in ocean waters, but return to their natal rivers to spawn in the spring. The rivers that feed into the Chesapeake Bay and the Delaware and Hudson Rivers are the major spawning grounds for the coastal migratory population. The spawning season along the Atlantic coast usually extends from April to June and is governed largely by water temperature (Smith and Wells 1977) and the number of mature ova in female striped bass varies by age, weight, and fork length. Studies have found that older fish produce more eggs than younger fish and heavier fish produce more eggs than smaller fish (Jackson and Tiller 1952; Raney 1952; Goodyear 1984; Mihursky 1987; Richards et al. 2003; Sadler et al. 2006; Gervasi et al. 2019). Newly hatched bass larvae remain in fresh or slightly brackish water until they are about 12 to 15 mm long and move in small schools toward shallow protected shorelines, where they remain until fall. Over the winter, the young concentrate in deep water of rivers.

The 2018 assessment used maturity-at-age values derived from an updated dataset with samples from multiple states along the coast, which estimated that 89% of females are mature by age-8 and 100% are mature by age-9. There are indications that some older striped bass may not spawn every year (Raney 1952) and Jackson and Tiller (1952) reported curtailment of

spawning in about 1/3 of the fish age-10 and older taken from Chesapeake Bay, though they also found striped bass up to age-14 in spawning condition.

Striped bass, like many fish populations, shows high interannual variability in recruitment. Environmental effects have been shown to be correlated with recruitment success in striped bass, including over-winter temperatures, hydrological conditions, and zooplankton prey availability (Hurst and Conover 1998; Martino and Houde 2010 and 2012). However, Martino and Houde (2012) found density-dependent effects on growth and mortality in the upper Chesapeake Bay for age-0 striped bass, where growth rates were higher and mortality rates lower in years with lower juvenile density.

1.2.1.4 Mortality

Because striped bass are a long-lived species, this suggests natural mortality is relatively low. One increasing source of natural mortality is disease. Mycobacteriosis was first detected in the Chesapeake Bay in 1997 (Heckert et al 2001; Rhodes et al. 2001) and may have been apparent in Chesapeake Bay striped bass as early as 1984 (Jacobs et al. 2009a). A rise in *mycobacterium* infection in the Chesapeake Bay could be causing increases in natural mortality (Pieper 2006; Ottinger and Jacobs 2006). Vogelbein et al. (2006) hypothesized that increased natural mortality could be associated with elevated nutrient inputs to the Chesapeake Bay contributing to eutrophication and suboptimal, stressful habitat for striped bass; or, the increased natural mortality could be associated with low abundance of Atlantic menhaden and reductions in Chesapeake Bay forage species resulting in starvation.

Prevalence of *mycobacterium* infection ranges from ~50% (Overton et al. 2003) to 75% with molecular techniques (Kaattari et al. 2005) and is dependent on the age class sampled, with prevalence increasing with age to approximately age 5 and then decreasing in older ages (Kaattari et al. 2005; Gauthier et al. 2008). *Mycobacteriosis* appears to be much less prevalent in other producer areas such as the Delaware Bay (Ottinger et al. 2006) and the Albemarle Sound-Roanoke River (Overton et al. 2006; Matsche et al. 2010). Although fish who are infected with the disease show overall decreased health (Overton et al. 2003), the slow progression of the disease may take years to become lethal in infected fish, thus allowing for multiple spawning opportunities, making determination of the population level impacts of the disease difficult (Jacobs et al. 2009b). In the most recent study, Groner et al. (2018) suggested disease-associated mortality will likely increase with warming temperatures in the Chesapeake Bay.

Striped bass exhibit a number of characteristics identified by NOAA as increasing their vulnerability to climate change effects, including complexity of reproductive strategy, short duration aggregate spawning, sensitivity to temperature, prey-specificity, and specific larval requirements (Morrison et al. 2015). Temperature is correlated with or impacts a number of aspects of striped bass biology, including time to hatch and egg and larval mortality (Massoudieh et al. 2011); larval growth length and yolk utilization (Peterson et al. 2017); activity levels and metabolic rate (Hollema et al. 2017); consumption, and growth (Secor et al. 2000); and growth and mortality in striped bass larvae (Secor et al. 2017). See *Section 1.4.3* for details on climate change impacts to striped bass habitat.

1.2.1.5 Ecological Roles

Young-of-year striped bass feed primarily on small invertebrates like amphipods, bristle worms, and mysid shrimp. As they get older, they start eating fish and larger invertebrates (starting around age-2). Adult striped bass consume a variety of species, including Atlantic menhaden, herring, bay anchovies, blue crabs, and lobster (Schaefer 1970; Hartman and Brandt 1995; Walter et al. 2003; Rudershausen et al. 2005; Ferry and Mather 2012). Their diet varies depending on how big they are, what season it is, where they are feeding, and how abundant their different prey species are (Walter and Austin 2003; Overton et al. 2009). Striped bass are also preyed on by other species. As young-of-year and juveniles, they are consumed by adult fish like bluefish, weakfish, and even other striped bass, and larger striped bass may be eaten by sharks or birds like bald eagles and osprey (ASMFC 2011).

Managers and stakeholders have expressed interest in the role of striped bass in the ecosystem from both a top-down perspective (as a predator that could affect other species) and a bottom-up perspective (as a consumer that was affected by prey availability). The high abundance of striped bass in the late 1990s and early 2000s led to concerns that striped bass could have a negative impact on other species that they preyed on, like shad and river herring, or that they competed with for food, like weakfish (Uphoff 2003; Davis et al. 2012). Declines in striped bass condition and the increasing prevalence of mycobacteriosis in Chesapeake Bay raised concerns that the depletion of key prey species like Atlantic menhaden were negatively affecting striped bass (Jacobs et al. 2009; Overton et al. 2003).

In August 2020, ASMFC adopted an ecosystem approach for the management of Atlantic menhaden using ecological reference points (ERPs) for menhaden management. Ecological modeling indicated striped bass were one of the most sensitive species to menhaden abundance. Therefore, the ERP values that sustained striped bass would likely provide sufficient forage for other predators under current ecosystem conditions. ERPs for the management of Atlantic menhaden are as follows:

- ERP target: The maximum fishing mortality rate on Atlantic menhaden that sustains Atlantic striped bass at their biomass target when striped bass are fished at their F target
- ERP threshold: The maximum fishing mortality rate on Atlantic menhaden that keeps Atlantic striped bass at their biomass threshold when striped bass are fished at their fishing mortality rate target.

These ERPs allow ASMFC to take into account menhaden's role as a forage fish, especially its importance to striped bass, when setting harvest limits for menhaden. However, the biological reference points for striped bass are still set using single-species modeling. ASMFC is working on refining the ERP model and improving the understanding of the role of striped bass in the ecosystem beyond the relationship with menhaden.

1.2.2 Stock Assessment Summary

The 2018 Benchmark Stock Assessment (NEFSC 2019) provides the most recent status of the coastwide striped bass stock for use in fisheries management. The assessment was peer-reviewed at the 66th Northeast Regional Stock Assessment Review Committee (SARC) meeting in November 2018 and approved by the Board for management use in May 2019. The accepted assessment model is a forward projecting statistical catch-at-age (SCA) model which uses catch-at-age data and fishery-dependent and -independent survey indices to produce annual estimates of recruitment, annual fishing mortality (F), and selectivity parameters in order to calculate abundance and female SSB through the assessment terminal year of 2017. As a complement to the SCA model, an instantaneous tag return model (IRCR) was run on data from the U.S. Fish and Wildlife Service (USFWS) coastwide striped bass tagging program through the 2017 tagging year. The IRCR model makes inferences using the numbers of tagged fish that have been recaptured to the numbers of fish that were originally tagged over time to estimate the survival rate of striped bass from year-to-year, fishing mortality rates and natural mortality rates.

The 2018 benchmark was the first assessment for striped bass to use the improved MRIP survey methods to estimate recreational fishery catches. The new time series of recreational catch estimates is on average 2.3 times higher than the values used in previous stock assessments, resulting in higher estimates of stock size. Although the magnitude of these estimates has changed, the overall trend throughout time remains similar for both harvest and total catch (released fish + harvested fish).

1.2.2.1 Abundance and Structure

Striped bass abundance (age-1+) increased steadily from 1982 through 1997 when it peaked around 420 million fish. Total abundance fluctuated without trend through 2004 and from 2005-2009, total abundance declined to around 189 million fish. Total abundance increased to 351 million fish by 2016 before dropping to 249 million fish in 2017. The increase in 2012 was due primarily to the abundant 2011 year class from Chesapeake Bay. Abundance of age-8+ striped bass (representing mature fish) increased steadily through 2004. Between 2004 and 2011, age-8+ abundance oscillated followed by a decline since 2011. Age-8+ abundance in 2017 was estimated at 6.7 million fish, a value near the 30th percentile of the time-series.

1.2.2.2 Fishing Mortality

The current single-stock SCA model separates fishery removals into an ocean fleet and a Chesapeake Bay fleet, but there is one set of coastwide fishing mortality reference points. The ocean fleet includes removals from ocean waters and other areas such as Delaware Bay and Long Island Sound. Fully-recruited fishing mortality in 2017 for the Chesapeake Bay and Ocean fleets was 0.068 and 0.262, respectively. Total fishing mortality has been at or above the threshold in 13 of the last 15 years of the assessment (2003-2017) and was estimated to be 0.31 in 2017.

1.2.2.3 Recruitment

Striped bass experienced a period of strong recruitment (age-1 fish entering the population) from 1994-2004, followed by a period of lower recruitment from 2005-2011 (although not as low as the early 1980s, when the stock was considered collapsed). This period of low recruitment contributed to the decline in female SSB that the stock has experienced since 2010. Recruitment of age-1 fish was high in 2012, 2015, and 2016 (corresponding to strong 2011, 2014, and 2015 year classes), but estimates of age-1 striped bass were below the long-term average in 2013, 2014, and 2017. Recruitment in 2017 was estimated at 108.8 million age-1 fish, below the time series average of 140.9 million fish.

1.2.2.4 Female Spawning Stock Biomass (SSB)

Female SSB peaked in 2003 and has been declining since then; female SSB has been below the threshold level since 2013. Female SSB grew steadily from 1986 through 1996 after which female SSB dropped to just below levels observed in 1995. Female SSB grew steadily between 1999 and 2003 when it peaked around 114,000 thousand metric tons and has generally declined since then.

1.2.2.5 Two-Stock Model Development

Although the coastwide fishing mortality reference points include the effects of harvesting smaller striped bass in the Chesapeake Bay (and in other areas like the Delaware Bay and Hudson River), they do not reflect the heavily male-skewed sex ratio in the Chesapeake Bay catch. During the 2018 benchmark assessment, the current single-stock SCA model was modified into a competing two-stock SCA model; a Chesapeake Bay stock and a mixed ocean stock which included all other stock components of the population. The intent of the two-stock model approach was to develop separate reference points for the Chesapeake Bay stock and the ocean region (which includes the Delaware Bay/Hudson River stock complex); however, this model requires further testing and was not approved for management by the SARC-66 peer review panel.

1.2.3 Current Stock Status

The current stock status determination is based on the 2018 Atlantic Striped Bass Benchmark Stock Assessment (NEFSC 2019). The results of the 2018 benchmark indicate that the Atlantic striped bass stock is overfished and overfishing is occurring. Female SSB in 2017 was estimated at 68,576 metric tons (151 million pounds), which is below the female SSB threshold of 91,436 metric tons (202 million pounds) (Figure 6). Total fishing mortality in 2017 was estimated at 0.31, which is above the fishing mortality threshold of 0.24 (Figure 7). The reference points currently used for management are based on stock conditions in 1995, the year the stock was declared rebuilt. The biomass threshold is the level of female SSB in 1995, the biomass target is 125% of the threshold, and the fishing mortality threshold and target are the levels of fishing mortality projected to achieve the biomass reference points over the long-term, respectively. The specific values of these reference points change when the time series of female SSB is updated with each iteration of the stock assessment model.

1.3 DESCRIPTION OF THE FISHERY

The Atlantic striped bass fishery is predominantly recreational with the recreational sector accounting for over 80% of total removals by number each year since 1985 (Table 12). In 2019, total removals (commercial and recreational combined, including harvest and dead releases) were estimated at 5.5 million fish; the recreational sector accounted for 87% of total removals by number. In 2020, total removals were estimated at 5.1 million fish; the recreational sector accounted for 87% of total removals by number (Table 11-12).

1.3.1 Commercial Fishery

Commercial striped bass fisheries operate in the waters of Massachusetts, Rhode Island, New York, Delaware, Maryland, the Potomac River Fisheries Commission, Maryland, Virginia, and North Carolina. The primary gear types for the commercial fisheries are gill nets, hook and line, and pound nets/other fixed gears. Additional gears used in the commercial fishery include haul seines and trawls.

The commercial fishery is managed via a quota system resulting in relatively stable landings since Amendment 6 (approved in 2003; implemented in 2004). From 2004 to 2014, coastwide commercial harvest averaged 6.8 million pounds (942,922 fish) annually (Tables 13-15). From 2015-2019, commercial landings decreased to an average of 4.7 million pounds (619,716 fish) due to implementation of Addendum IV and a reduction in the commercial quota. Commercial landings in 2020 were estimated at 3.6 million pounds (577,363 fish). Commercial discards are estimated to account for <2% of total removals per year since 2003 (Tables 12). In 2019, commercial removals (landings plus commercial discards) accounted for 13.5% of total removals (commercial plus recreational) in numbers of fish, and 12.6% of total removals in 2020.

There are two sets of quota allocations; one to all states (Maine through North Carolina, excluding Pennsylvania) for harvest in the ocean, and a second allocation to Maryland, PRFC, and Virginia for harvest in Chesapeake Bay. The ocean region quota is based on average landings during the 1970s and the Chesapeake Bay quota changed annually under a harvest control rule until implementation of a static quota in 2015 through Addendum IV. Although the regional quota allocations are about equal, the majority of commercial harvest comes from Chesapeake Bay; roughly 60% by weight and 80% in numbers of fish since 1990. The differences between landings in weight and in numbers of fish are primarily attributed to the availability of smaller fish and lower size limits in Chesapeake Bay relative to the ocean fishery. Additionally, the ocean fishery tends to underutilize its allocations due to lack of availability in state waters (particularly off of North Carolina) and because commercial fishing is not allowed in some states (Maine, New Hampshire, Connecticut and New Jersey). Furthermore, the underage has increased in recent years since migratory striped bass have not been available to the ocean fishery in North Carolina resulting in zero harvest since 2012 (North Carolina holds 13% of the ocean quota).

1.3.2 Recreational Fishery

The recreational fishery is comprised of private and for-hire components. The private component includes anglers fishing from shore (including all land-based structures) and private/rental boats. The for-hire component is composed of charter boats and headboats (also called party boats). Although charter boats tend to be smaller than headboats, the key distinction between the two types of operations is how the fee is typically determined. On a charter boat trip, the fee charged is for the entire vessel, regardless of how many passengers are carried, whereas the fee charged for a headboat trip is paid per individual angler.

The recreational sector operates in state waters across the entire management unit (Maine through North Carolina) and uses hook and line almost exclusively. The recreational fishery is managed via bag and size limits and therefore recreational catch and harvest vary from year to year with changes in angler effort and the size and availability of fish.

Recreational harvest of striped bass follows a similar trend to the commercial harvest. Since 1984 when recreational harvest was lowest (2.4 million pounds; 264,004 fish), recreational harvest has increased reaching a peak by weight in 2013 at 65 million pounds, and by numbers of fish in 2010 at 5.4 million fish (Tables 16-18). Between 2004 and 2014, recreational harvest remained at a steady level averaging 54.8 million pounds (4.6 million fish) per year. Following the implementation of the size and bag limit changes in the recreational fisheries in Addendum IV due to declining biomass, recreational harvest decreased to an average of 33.6 million pounds (2.8 million fish). In 2020, recreational harvest was estimated at 14.9 million pounds (1.7 million fish).

A large proportion of recreational harvest comes from Chesapeake Bay (Tables 16-18). From 2004-2014, 33% of recreational harvest in numbers of fish came from Chesapeake Bay. From 2015-2019, that percentage increased to 43% in numbers of fish, likely as a result of the strong 2011, 2014, and 2015 year classes moving through the fishery. The majority of recreational harvest in the ocean fishery comes from Massachusetts, New York, and New Jersey.

The vast majority of recreational striped bass catch is released alive either due to angler preference or regulation; roughly 90% annually since 1990 (Figure 12). Based on peer reviewed literature, a 9% release mortality rate is used to estimate the number of fish that die as a consequence of being caught and released. Despite this low rate, the popularity of striped bass as a targeted recreational species means that recreational releases contribute a significant source of mortality to the stock each year. In 2020, recreational anglers caught and released an estimated 30.7 million fish, of which 2.76 million (9%) are assumed to have died; this represents 54% of total striped bass removals (commercial and recreational) in 2020 (Tables 12, 16).

1.3.3 Subsistence Fishing

Data describing the exact magnitude of subsistence fishing, (i.e., catching fish in order to provide necessary food) for striped bass does not exist. However, some anglers, usually fishing

from shore, may rely to some degree on striped bass they catch for food. Additionally, the head and carcasses of larger striped bass often discarded by anglers after processing the fillet are highly sought after in some areas.

1.3.4 Non-Consumptive Factors

Catch and release fishing for striped bass is often considered a non-consumptive use of the striped bass resource. A large number of fishermen coastwide target striped bass with the intention of releasing all of the fish that are caught. This practice can take place during no-harvest (i.e., no-take) closures, but is not permitted during no-targeting closures. See *Section 1.3.2* for more details on the number of striped bass released alive.

1.3.5 Interactions with Other Fisheries

In the recreational fishery, anglers targeting striped bass may also be targeting species that commonly occur with striped bass. Or, striped bass anglers may incidentally interact with non-target species. The 2018 stock assessment (NEFSC 2019) included analysis identifying recreational species that are commonly caught with striped bass in ocean waters (i.e., species that were intercepted at least 100 times over the entire time series) for each state based on private/rental boat trip data that occurred during Waves 3-5 for states from Maine through Virginia. A Jaccard coefficient was calculated for each species, with a higher coefficient indicating the species is caught more often with striped bass. For most states, bluefish or Atlantic mackerel had the highest Jaccard coefficient, meaning it was the species caught most often with striped bass in ocean waters.

Striped bass are caught as bycatch in non-striped bass commercial fisheries. The commercial discard estimates for striped bass incorporate estimated discards from non-striped bass fisheries based on tag return data.

1.4 HABITAT CONSIDERATIONS

1.4.1 Habitat Use and Migration Patterns

Migration of striped bass occurs at adult and juvenile stages. Adults migrate into rivers to spawn in turbulent fresh water upstream of the estuarine turbidity maximum (ETM) and as far as the Fall Zone (transition zone from Coastal Plain to Piedmont provinces) during spring (Greene et al., 2009). Afterwards, migratory adult striped bass return to the ocean, where they travel north along the coast in summer and fall, and south during the winter; non-migratory adult striped bass return downstream to estuarine waters but do not transit coastal waters during the summer, fall, and winter (Greene et al., 2009).

In general, juveniles migrate downstream in summer and fall. Juvenile striped bass migration varies by locations. In Virginia, the movement of young bass during their first summer is downstream into Chesapeake Bay waters of higher salinity (Setzler et al., 1980). In the Hudson

River, striped bass begin migrating in July. Migration was documented through an increase in the number of juvenile striped bass caught along the beaches and subsequent decline in the numbers in the channel areas after mid-July. Downstream migration continues through late summer, and by the fall, juveniles start to move into Long Island Sound (Raney, 1952). The ASMFC Striped Bass Technical Committee (TC) tracks juvenile abundance, and cohort strength, through sampling to produce annual striped bass juvenile abundance indices (JAIs) in six different nursery areas.

Juvenile striped bass rarely complete coastal migrations. The presence of juveniles <20 cm (ages 0-1) in New Jersey's non-natal estuaries indicates some dispersal from Hudson River, Delaware Bay, and Chesapeake Bay (via C&D Canal) estuaries where they were spawned (Able et al., 2012). Many striped bass inhabiting rivers and associated estuaries undergo evacuation into coastal waters following extreme precipitation events that reduce water temperature, salinity, and dissolved oxygen (Bailey & Secor, 2016); events projected to increase in frequency and intensity due to climate change (USGCRP, 2017). In Chesapeake Bay 50% of females, who grow faster, emigrate to coastal waters by age 3 while a significant proportion of young males remain within the estuary (Kohlenstein, 1981); however, emigration cues are under debate and may be more a function of size than age (Secor et al., 2020). From Cape Hatteras (and in some years, Cape Lookout), North Carolina, to New England, fish may migrate in groups along the coast. They migrate north in the summer and south in the winter, however, the extent of the migration varies between sexes and populations (Hill et al., 1989). Larger bass, typically the females, tend to migrate farther distances. Striped bass historically were not usually found more than 6 to 8 km offshore (Bain & Bain, 1982). In the past decade, large schools have been moving between state waters and federal Exclusive Economic Zone (EEZ) waters during the year (Kneebone et al., 2014) and further offshore during the winter months (ASMFC, MDDNR, NCDMF and USFWS, unpublished data) well out into federal EEZ waters (e.g., 25-30 nm, or 46.3 to 55.6 km). These coastal migrations are not associated with spawning and usually begin in early spring, but this time period can be prolonged by the migration of bass that are spawning.

Some areas along the coast are used as wintering grounds for adult striped bass. Historically the inshore zones between Cape Henry, Virginia, and Cape Lookout, North Carolina, served as the wintering grounds for the migratory segment of the Atlantic coast striped bass population (Setzler et al., 1980). Geographic Information Systems (GIS) analysis of cooperative winter tagging cruise data from 1988-2013 did not detect a northward latitudinal shift in highest percent capture of striped bass, although occurrence of a longitudinal shift was not included in the analysis (Osborne, 2018). However, recent Atlantic coastal striped bass winter sampling coordinated by ASMFC indicated that overwintering striped bass have been encountered north of Chincoteague Inlet, Virginia to Ocean City, Maryland and in offshore areas entering the EEZ. There are three or more groups of fish that are found in nearshore ocean waters of North Carolina, Virginia, and Maryland between the months of November and March, the wintering period. These groups include striped bass from Albemarle and Pamlico Sounds, North Carolina, Chesapeake Bay, and Hudson River (ASMFC, MDDNR, NCDMF and USFWS, unpublished data); and of these, large striped bass spend the summer in New Jersey and north (Holland & Yelverton, 1973; Nelson et al., 2010; Pautzke et al., 2010). Based on tagging studies conducted

under the auspices of ASMFC and the Southeast Area Monitoring and Assessment Program (SEAMAP) each winter since 1988, striped bass wintering off North Carolina, Virginia, and Maryland range widely up and down the Atlantic Coast, at least as far north as Nova Scotia, and represent all major migratory stocks (US Fish and Wildlife Service, ASMFC, and partners, unpublished data).

1.4.2 Identification and Distribution of Habitat

1.4.2.1 Spawning and Egg Habitat

Striped bass spawn in fresh water or nearly fresh water of Atlantic Coast rivers and estuaries. They spawn above the tide in mid-February in Florida but in the St. Lawrence River they spawn in June or July. The bass spawn in turbid areas as far upstream as 320 km from the tidal zone (Hill et al., 1989). The tributaries of the Chesapeake Bay are the primary spawning areas for the migratory stock of striped bass, but other major areas include the Hudson River, Delaware Bay, and the Roanoke River. Prior to spawning, females pause below the salt front (Hocutt et al., 1990) while eggs ripen and water temperature reaches 12-18 degrees Celsius (Secor, 2000) before continuing into freshwater reaches. Spawning is triggered by increased water temperature, occurs between 10 and 24 degrees Celsius, and generally peaks at temperatures between 14 and 19 degrees Celsius (Setzler et al., 1980). Spawning is characterized by brief excursions to the surface by females surrounded by males, accompanied by much splashing. Females release eggs in the water where fertilization occurs (Raney, 1952). Spawning occurs during all hours of day and night (Setzler et al., 1980). Striped bass spawning runs may be blocked when the concentration of total suspended solids exceeds 350 mg/L (Radtke & Turner, 1967).

An egg is only viable for about an hour for fertilization. Following fertilization, the fertilized eggs are spherical, non-adhesive, and semi-buoyant and will harden within one to two hours at 18 degrees Celsius (Hill et al., 1989). Survival of striped bass eggs is dependent on environmental conditions. In general, cooler and wetter winter and spring conditions are favorable. A temperature range of 17-19 degrees Celsius is important for egg survival as well as for maintaining appropriate dissolved oxygen levels (Bain & Bain, 1982), although they can tolerate a temperature range of 14-23 degrees Celsius (Mansueti, 1958). Eggs hatch from about 30 hours at 22 degrees Celsius to about 80 hours at 11 degrees Celsius (Hill et al., 1989). Eggs can tolerate dissolved oxygen levels down to 1.5 mg/L and salinities ranging from 0-10 ppt with 1.5-3 ppt being optimal (Mansueti, 1958). Water currents are an important factor for the survival of the eggs. Minimum water velocity of 30 cm/sec, from either current or tidal flow, is needed to keep the eggs suspended in the water column; the optimum flow rate is 100-200 cm/sec (Mansueti, 1958). An oil globule provides some buoyancy for the egg, and it is larger when water velocity is slower (Albrecht, 1964). Without the buoyancy, the eggs sink to the bottom, where the sediment may smother them. It is possible for the eggs to hatch if the sediment is course and not sticky or muddy, but survival is limited (Bayless, 1972). Suspended sediment loads ≥1,000 mg/L were lethal to striped bass eggs but were tolerant to loads of 0-500 mg/L (Auld & Schubel, 1978).

1.4.2.2 Larvae Habitat

There are three stages of larval development. These are: yolk-sac larvae, finfold larvae, and post-finfold larvae (Hill et al., 1989). The yolk-sac larvae occur right after hatching and the stage usually lasts for about 3 to 9 days. They are 2.0 to 3.7 mm in length and contain an easily identified yolk-sac. Yolk-sac larvae occur in open water at varying depths (Setzler et al., 1980). This phase is finished when the yolk-sac is absorbed. The finfold phase lasts for about 11 days and the striped bass reach a length of 12mm (Setzler et al., 1980). Occurrence of finfold larvae varied with time of day and depth (Hill et al., 1989). The last phase is the post-finfold larvae which lasts for about 20 to 30 days and the larvae reach a length of 20 mm (Bain & Bain, 1982). Post-finfold striped bass larvae are present at varying depths in open waters of estuaries.

Survival of the larvae depends on optimal conditions of three main factors: temperature, salinity, and dissolved oxygen. The optimal temperature for larvae is 18 to 21 degrees Celsius, but temperatures of 12 to 23 degrees Celsius can be tolerated (Bain & Bain, 1982). Studies have shown that striped bass larvae do better and have a higher survival rate when they are in low salinity waters (>0-15 ppt) rather than fresh water (Setzler et al., 1980). Abundance was highest in oligohaline portions of the St. Lawrence Estuary ETM zone; 60 times higher than in tidal fresh water and 330 times higher than in mesohaline ETM waters (Vanalderweireldt et al., 2019). The third factor, dissolved oxygen, is equally critical for larvae as it was for the egg stage. A reduction in the dissolved oxygen level reduces the chances of survival of the larvae (Turner & Farley, 1971), which have a lower limit of 3 mg/L (Chittenden, 1971). Poorly buffered rivers may have significant changes in pH. A pH of 5-6.5 in the absence of contaminants causes significant mortality to 11-13 day old fish and a pH of 5.5 is toxic to 159-day-old fish (Buckler et al., 1987). Another factor that influences the survival of striped bass larvae is turbulence. While at first it is necessary for the larvae to reside in turbulent waters to maintain position, the larvae quickly become motile and then are able to maintain position on their own (Doroshev, 1970). Optimum flow for larvae is 30-100 cm/sec although larvae can survive 0-500 cm/sec (Regan et al., 1968). Suspended sediment loads ≥500 mg/L had a significant negative effect on larval survival (Auld & Schubel, 1978).

1.4.2.3 Juvenile Habitat

Striped bass become juveniles at about 30 mm, when the fins are fully developed. At this point they resemble adults. Temperature tolerance for young-of-year striped bass 20-100 mm ranges from 10-30 degrees Celsius and 18-19 degrees Celsius is optimal (Bogdanov et al., 1967, as cited in Setzler, 1980). Salinity does affect striped bass' capacity to survive low temperatures. Young-of-year striped bass exposed to 5 degrees Celsius water had greater survival across a broad range of salinities (5-35 ppt); however, when exposed to 1 degree Celsius water young-of-year striped bass survival was greater within a narrower salinity range of 10-25 ppt (Hurst & Conover, 2002). Striped bass juveniles exhibit a warmwater fundamental temperature niche (Coutant, 2013); e.g., 80-270 mm (0.25-0.72 kg) fish selected 24-27 degree Celsius water (Coutant et al., 1984) and 430-626 mm (0.91-3.52 kg) fish occupied 20-24 degrees Celsius water (Coutant & Carroll, 1980). Juveniles can tolerate water up to 30-33.5 degree Celsius provided there is sufficient dissolved oxygen (Coutant, 2013). As the juvenile bass grow, they migrate to nearshore areas and then to higher salinity areas of an estuary (Raney, 1952) usually remaining

upstream of polyhaline waters (Able et al., 2012) optimally at 10-20 ppt (Bogdanov et al., 1967, as cited in Setzler, 1980). Young-of-year striped bass are less tolerant of low dissolved oxygen than larvae and egg, having a lower limit of 3 mg/l and optimally ≥6 mg/l (Bogdanov et al., 1967, as cited in Setzler, 1980). Juvenile striped bass often occupy waters having a clean sandy bottom, but they have also been found over gravel beaches, rock bottoms, and soft mud areas suggesting that they do not require specific microhabitat conditions (Bain & Bain, 1982; Hill et al., 1989). Association with emergent marsh banks is common throughout the year and especially during spring and fall and commonly with submerged channel embankments in summer (Able et al., 2012). They are usually found in schools of as many as several thousand fish. However, the location of the schools depends on the age of the fish (Hill et al., 1989) and season. Juveniles 21-46 cm (ages 2-5) were most abundant at depths of 5.5-9.1 m in New Jersey nearshore coastal waters (Able et al., 2012), but during winter in Chesapeake Bay juveniles are known to migrate into holes down to 30.5 m deep (Mansueti, 1954).

1.4.2.4 Adult Habitat

Mature adult striped bass in the migratory contingents leave the estuaries and migrate along the coast where they have lower temperature requirements and comparable dissolved oxygen requirements as juvenile bass (Bain & Bain, 1982). The fundamental thermal niche of striped bass ≥3.1 kg is cool water at 17.5 (mean) to 19 (mode) degrees Celsius (Bettoli, 2005). Temperatures 25-30 degrees Celsius could be tolerated for limited durations provided sufficient dissolved oxygen concentrations were present (>2 mg/l), although condition declined and higher mortality occurred for fish >10 kg (Coutant, 2013). Lower temperature boundary for activity is 0.1-1 degree Celsius; rapid temperature changes can be tolerated (Greene et al., 2009). Striped bass are tolerant of a broad range of salinities (0-35 ppt) and abrupt changes to salinity (Greene et al., 2009). Depths occupied range from 0.6-46 m although straying into deeper waters does occur (Greene et al., 2009). Tagging studies indicate that fish from all stocks range widely along the Atlantic Coast, historically generally remaining in state (0-3 miles) waters but more recently in some areas entering the EEZ (3-200 miles; Kneebone et al., 2014; ASMFC, MDDNR, NCDMF and USFWS, unpublished data). GIS analysis of tagging data from 1988-2013 detected a 3-11 m vertical shift to deeper water and a shift to coarser sand grain size associated with the highest percent capture (Osborne, 2018). While in coastal and estuarine waters, striped bass are associated with a variety of habitats including substrates composed of sand, gravel, rock, boulder, eelgrass, and mussel beds; subsurface features such as sand bars, troughs, gullies, and shallow bays; floating rockweed; sandy and rocky shorelines; and in the surf zone (Greene et al., 2009).

1.4.3 Chemical, Biological, and Physical Threats to Striped Bass and Their Habitat

Residual chlorine; chlorinated hydrocarbons such as PCBs; monocyclic aromatic hydrocarbons such as benzene; and metals such as, copper, zinc, cadmium, mercury, and aluminum are known to be toxic to life history stages of striped bass. Residual chlorine causes 50% mortality in eggs when the concentration is 0.22 ppm, and there is 50% mortality in larvae when the concentration is 0.20 ppm (Hill et al., 1989). Chlorine was also observed to be a predominant factor in egg mortality by Hall et al. (1981). Ozone is an effective substitute for chlorine to

reduce fouling (Marine Research Incorporated, 1976). Studies have shown that ozone has a detrimental effect on striped bass eggs (Kosak-Channing & Helz, 1979). Eggs exposed to 0.05 mg/L and 0.10 mg/L of ozone in an estuarine environment were delayed in hatching, but only 70% of the eggs hatched in fresh water under the expected time frame. There was 6% mortality when the eggs were exposed to 0.06 mg/L of ozone for 12 hours, but there was 100% mortality when they were exposed for 36 hours. Effects of ozone and chlorine on striped bass eggs are comparable in estuarine waters, but ozone can have more of an effect if discharged in fresh water located near striped bass spawning areas (Hall et al., 1981). Exposure to sublethal levels of benzene for 24 hours increases the respiratory rates of juveniles and if they are exposed for longer periods of time, reversible narcosis can occur (Brocksen & Bailey, 1973). Chronic exposure to benzene can also result in difficulty locating and consuming prey (Korn et al., 1976). When striped bass are exposed to 6.9 ppm of benzene for 24 hours there is 50% mortality in juveniles (Benville & Korn, 1977). Copper and zinc have an effect on yolk-sac larvae, but eggs are unaffected by these metals. Juveniles can develop lesions in their gill tissue as well as impaired respiration when they are exposed to cadmium and mercury. Low pH increases the toxicity of aluminum (Rago, 1992) and high aluminum levels can severely alter epidermal microridge structures in larvae (Rulifson et al., 1986).

Increased attention is focused on emerging contaminants such as endocrine disruptors (pharmaceuticals, pesticides, industrial compounds, and personal care products), microplastics, and automotive derived compounds. Endocrine disruption of striped bass has not been studied; however, it is known to cause increased disease susceptibility, intersex (Blazer et al., 2007), and altered sexual development (Oberdörster & Oliver, 2001) in fishes. Microplastics are known to enter trophic pathways through ingestion (Au et al., 2017; Bergmann et al., 2015; Bour et al., 2020; Parker et al., 2020) as are nanoplastics through inhalation and gill uptake (Tetra Tech, 2020). Modeling efforts are underway to understand trophic pathways of microplastics exposure and accumulation in striped bass; however, study of potential physiological and behavioral effects is lacking (Tetra Tech, 2020). Striped bass response to automotive derived contaminants has not been studied, although road runoff has the capacity to cause abnormal behavior and physiological change (Chow et al., 2019; McIntyre et al., 2018).

Historically, physical threats to striped bass habitat were attributed to channelization, creation of dams, and land reclamation. In coastal regions, 50% of the original estuarine areas important to striped bass have been lost to filling, road construction, or real estate development (Clark, 1967; Kennish, 2002). In the South Atlantic region, dams restrict the upstream migration on the Roanoke, Tar, Neuse, and Pee Dee rivers (Baker, 1968). Efforts have been undertaken to restore access to historical striped bass spawning habitats through the provision of fishways or through removal of impediments to migration. Contemporary threats to striped bass access to spawning and nursery habitat include alteration of river flow regime by consumptive uses such as agriculture and manufacturing as well as dam operation (Cimino et al., 2009). Furthermore, access to aquatic habitats is largely driven by precipitation. Elevated spring precipitation and river flow increases volume of spawning and nursery habitat available to striped bass (Secor et al., 2017). Heavy winter and spring precipitation events in the northeast and eastern US

continue to increase in frequency and intensity coupled with a northward shift in the rain-snow transition zone (USGCRP, 2017).

Change in water temperature may be localized such as from industrial discharge or regional resulting from climate change. The localized heated water discharged from many power plants can cause thermal shock in the fish with the severity depending on the life stage (Schubel et al., 1976). Eggs are more sensitive and subject to greatly mortality from the high temperatures. Larvae and juveniles decrease in their susceptibility as they grow older, and there is not usually higher than 50% mortality of thermal shock in adults (Hill et al., 1989). Regionally, climate change has the potential to alter temperature and precipitation dynamics which directly affects timing of spawning migration as well as survival, growth, and habitat suitability throughout the year. In Chesapeake Bay, spawning female striped bass migration was earlier when spring water temperature was warmer (~3 days per 1 degree Celsius increase); this trend was more evident for larger females (Peer & Miller, 2014). Model projections for Hudson River spawning indicate occurrence up to 15 days earlier (Nack et al., 2019). Suitable temperatures, precipitation and flow, and prey availability directly affect larval striped bass survival (Martino & Houde, 2010; Millette et al., 2019); the temporal and spatial match of which are subject to disruption by climate change (Cimino et al., 2009). Increased winter temperatures may facilitate feeding efficiency, increase growth, and improve juvenile overwinter survival (Cimino et al., 2009); conversely warming of summer estuarine waters subjected to decreased dissolved oxygen will reduce available juvenile and adult summer habitat (Constantini et al., 2008). Striped bass occupied normoxic Patuxent River (Chesapeake Bay) waters at supraoptimal temperatures up to 31 degrees Celsius because of higher growth rate potential within the tributary (Kraus et al., 2015). The disease mycobacteriosis coupled with elevated summer sea surface temperature (>26 degree Celsius) appears to have a negative effect on striped bass survival in Chesapeake Bay (Groner et al., 2018). Climate warming conditions that raise estuarine and riverine surface water temperatures above 28 degrees Celsius concurrent with hypoxic bottom waters would expose striped bass to annual summer temperature-oxygen squeeze conditions that could limit growth and production (Constantini et al., 2008).

Since colonial times, conversion of forests and wetlands to agricultural, suburban, and urban uses has contributed to increased eutrophication and resultant hypoxic and anoxic conditions in the Chesapeake Bay watershed (Brush, 2009; Kemp et al., 2005) as has happened in many other watersheds. Hypoxic coastal waters reduce the extent of suitable fish habitat. Temperature-oxygen squeeze habitat conditions have been observed in Chesapeake Bay during summer and fall and where striped bass sought to avoid waters >27 degrees Celsius (Itakura et al., 2021). Hypoxia is common in coastal waters receiving inputs of anthropogenic derived nutrients (Hagy et al., 2004); particularly when those waters have strong density stratification, low tidal energy, and high surface temperatures during seasons where oxygen levels are already low (Breitburg, 2002). A contributing factor to hypoxia is the extent of impervious surface within the watershed where increases in impervious surface are associated with increased probability of hypoxic waters and reduced likelihood of young-of-year striped bass presence (Uphoff et al., 2011). In Chesapeake Bay, the volume of suitable juvenile and adult striped bass summer habitat has contracted as the volume of hypoxic water has increased (Cimino et al., 2009). Expansive

hypoxia coupled with warming water temperatures due to climate change will further reduce future summer habitat available to striped bass (Coutant, 1990).

Conversion of forested and wetland areas to agricultural, suburban, and urban uses are known to affect aquatic systems through increase of factors such as runoff volume and intensity; physical instability, erosion, and sedimentation; thermal pollution; contaminant loads including endocrine disruptors and microplastics; road salt; nutrients through nonpoint and direct discharges, sewage leaks and spills, and stormwater runoff; and disruption of organic matter dynamics. Watershed development associated with urban sprawl and population growth has resulted in significant impairment of striped bass habitat in Chesapeake Bay due to sedimentation, eutrophication, contaminants, flow alteration, and thermal pollution (Cimino et al., 2009). Increased urbanization is associated with increased mobilization of contaminants in runoff (Kaushal et al., 2020) which will be exacerbated by increasingly common and intense rain events. Percent impervious surface is a commonly used indicator of watershed development whereby 10% is a threshold for aquatic ecosystem deterioration (Cappiella & Brown 2001; Beach 2002). In essence, a watershed's percent impervious surface is a catchall index of aquatic habitat condition. Watershed percent impervious surface has been used to assess suitability of striped bass spawning and nursery habitat in Chesapeake Bay tributaries (Uphoff et al., 2011; Uphoff et al., 2020).

1.4.4 Habitat Management as an Element of Ecosystem Management

Migratory striped bass require a broad geographic range to complete their life cycle; consequently, the ecosystems used are vast and variable and the cooperative management approach embodied by ASMFC is necessary. Attempts to incorporate ecosystem management into fisheries management are increasing. Ecosystem management can be interpreted as a) the consideration of how the harvest of one species might impact other species in an ecosystem and incorporating that relationship in management decisions and b) the incorporation of the protection and enhancement of habitat features that contribute to fish production into the fishery management process. While the implementation of multispecies management is increasingly common, incorporation of habitat condition in the management framework and decision-making process is rare.

Biologists, fisheries managers, and fishermen all recognize that habitat quality is one of the keys to maintaining and improving fish stocks for harvest. Increasing demands for seafood and recreation requires that fisheries regulations provide for maximizing yield, minimizing bycatch, and rebuilding and maintaining adequate spawning stocks. Effective fishery management requires more than issuing regulations governing sizes, seasons and catch limits. Degraded habitat negatively affects aquatic communities necessary to support fish life, reduces levels of fish, and inhibits management to provide adequate fish for food or recreational experiences.

Fisheries managers recognize that provisions must be made for agriculture, housing, commerce, and transportation that support our present and growing population; however, components of an unaltered watershed including forested uplands, wetlands, and tidal and

nontidal streams are integral for maintaining suitable fish habitat. By 2020 the terrestrial portions of Chesapeake Bay watershed comprised 17% actively used for agriculture, 11% had been developed, and 60% was forested (Chesapeake Conservation Partnership, 2020). These watershed wide percentages are not uniformly distributed among spawning tributaries. For example, the Potomac River is estimated at 26% agriculture and 26% developed, the Choptank River is estimated at 48% agricultural and 10% developed, and the James River is estimated to be 14% agricultural and 11% developed (Chesapeake Bay Program as cited in Chesapeake Bay Foundation, 2021). Population within the Chesapeake Bay watershed will increase from 18 million in 2020 to a projected 22.5 million by 2050 and with it an estimated additional 570,000 acres or 1.3% of land area converted to developed land (Chesapeake Conservation Partnership, 2020). Inherent in land development is increased impervious surface, its veritable permanence, and resultant exacerbation of chemical, biological, and physical threats to striped bass habitat. As ecosystems are altered, production of coastal fishery resources is typically reduced.

Habitat management, as a tool of fisheries management, was traditionally practiced by installation and manipulation of physical structures in the water for the benefit of aquatic life, remediation of point source pollution, removal of stream blockages, and planting of streamside trees. These traditional practices have demonstrated benefit and continue to be employed. However, fisheries management must consider the myriad of impacts that result from land use change and implement environmental protection and restoration activities outside the traditional scope of fish management.

At the federal level, the coastal Regional Fisheries Management Councils' fisheries management plans (FMPs) and Federal EEZ FMPs all now are required to define Essential Fish Habitat (EFH) including Habitat Areas of Particular Concern (HAPC) and to be proactive in protecting it. A report to Congress by an Ecosystems Principles Advisory Panel, Ecosystem-Based Fishery Management (1999), recommended that Regional Management Councils develop Fisheries Ecosystem Plans that recognizes the interrelationships between species and the habitat needs of the managed species. The ASMFC FMP process has habitat protection as one of its objectives (ASMFC, 2019). Each of the cooperating states of the ASMFC should incorporate habitat protection recommendations in its state waters as an element of their fisheries management framework. However, state fisheries management agencies often lack jurisdiction to mandate measures to protect and conserve fish habitat. Variously named state and county departments of natural resources, environment, coastal resources, and health have the primary responsibilities for programs that protect, promote, and enhance environmental quality for residents and living resources. Fisheries management agencies must integrate their fish production objectives with activities of these habitat management agencies. For example, North Carolina has mandated the preparation and implementation of a Coastal Habitat Protection Plan, which requires the collaboration of the state's Coastal Management,

Environmental Management, and Marine Fisheries commissions.[2] Active involvement of fisheries management agencies in strategic planning, application of regulatory controls and permits that feature protection of environmental quality, and production of fish as objectives can provide for human needs while minimizing the impact on ecosystems.

1.5 IMPACTS OF THE FISHERY MANAGEMENT PROGRAM

1.5.1 Biological and Ecological Impacts

Options to address recreational release mortality through seasonal closures, gear restrictions, and/or education and outreach may reduce the number of striped bass released alive (through seasonal closures) or may increase the chance of survival of striped bass caught and released in the recreational fishery (through gear restrictions and education/outreach). Some seasonal closure options would offer additional benefit to the stock by reducing effort during seasons associated with higher post-release mortality rates or by protecting spawning or pre-spawn fish, which could contribute to stock rebuilding. Changes to the management triggers may affect how quickly and how often the fishing mortality rate, which is the rate at which striped bass are dying because of fishing, is adjusted.

1.5.2 Social and Economic Impacts

This Amendment includes several measures which could carry social and economic impacts, notably potential implementation of seasonal closures. Changes in spatial or seasonal closures, gear restrictions, bag and size limits, and other effort controls affect important attributes of a recreational fishing trip, such as the number of fish of each species that anglers catch and are allowed to keep. In turn, these changes in trip attributes will modify the utility (i.e., level of satisfaction) an angler expects to obtain from the fishing trip (McConnell et al. 1995, Haab and McConnell 2003). As a result, the angler may shift target species, modify trip duration or location, or decide not to take the trip and do something else instead. These behavioral responses lead to changes in directed fishing effort, with accompanying changes in harvest, fishing mortality, and angler welfare. This is, however, only a short-term response and stock dynamics will dictate any longer-term effects on the resource, which may subsequently feed back and affect future management decisions and angling behavior.

Assessing the fishery impacts and potential success of proposed policy measures requires a predictive model that links angler participation and decision-making to changes in management measures, stock levels, and fishing conditions. When data describing angler trip-taking, species targeting, and/or harvest decisions are available, fisheries economists can utilize bioeconomic models to assess the impact of changes in regulation on recreational fishing. Bioeconomic models seek to assess the total effect of changes in policy, immediate and future.

[2] See https://deq.nc.gov/about/divisions/marine-fisheries/public-information-and-education/habitat-information/chpp for more information.

Bioeconomic models combine an economic sub-model with a biological sub-model, which are linked via the impact of angler behavior and fishing mortality on stock dynamics. The integrated model is characterized by two-way feedback loops between fish stocks and angler decision-making in terms of participation, species targeting, and harvest. The number of trips, angler preferences for harvest and release, stock sizes, and regulations jointly determine fishing mortality which, in turn, impacts both future stock levels and future recreational fishing outcomes (Jarvis 2011, Lee at al. 2017). The economic sub-model uses anglers' preferences for different trip attributes to derive anglers' demand for recreational trips under alternative policy scenarios. The biological sub-model, typically an age-structured or size-structured population dynamics model in discrete time, specifies the effect of recreational fishing on the future structure and abundance of the population. Before conducting simulations under alternative policy scenarios, the integrated bioeconomic model can be calibrated such that the number of predicted trips under existing regulations corresponds to MRIP effort estimates (Lee at al. 2017, Holzer and McConnell 2017). The use of bioeconomic simulations allows for a wide range of analyses regarding policy options, often including novel regulatory alternatives, and provides both expected outcomes, in terms of stock abundances and angler welfare, as well as confidence levels around these outcomes.

Recent research into striped bass anglers' preferences and behavior illustrates the connection between regulatory policies and fishing effort while also providing information that could be used to operationalize a bioeconomic model for striped bass management in the future.

Murphy et al. (2019) surveyed striped bass anglers from Massachusetts, Connecticut, Virginia, and North Carolina, collecting data on angler motivations, attitudes, behavior and responses to alternative policy measures. The authors found that changes in size and bag limits led to changes in trip-taking, species targeting, and harvest decisions; these changes in behavior were correlated with angler characteristics such as consumptive orientation (i.e., different attitudes toward catching fish, keeping fish, catching large numbers of fish, and catching trophy fish) and that attitudes; and motivations of striped bass anglers were considerably diverse.

Carr-Harris and Steinback (2020) developed an angler behavioral model using stated preference choice experiment data collected from striped bass anglers from Maine through Virginia. The model was used to simulate trip-taking, harvest decisions, fishing mortality, and angler welfare across a range of alternative policy measures for anglers in Massachusetts, Rhode Island, and Connecticut, incorporating the impacts of fish size on angler behavior, utility, and resulting size- and sex-specific fishing mortality. The authors found that the range of economically efficient policies (i.e., policies that maximize angler welfare for a given level of recreational fishing mortality) was broad if managers were concerned with controlling recreational fishing mortality only, though considerably narrower if protecting female spawning stock was instead the primary management objective. Carr-Harris and Steinback (2020) note their behavioral model could be extended geographically and combined with a population dynamics sub-model to form an integrated bioeconomic model that would be capable of assessing feedbacks and long-run impacts of management decisions on anglers and the striped bass resource. Such an integrated model would allow the ASMFC to estimate the impact of alternative policy options (such as

those in draft Amendment 7), as currently done by the New England Fishery Management Council for the cod and haddock recreational fishery (Lee et al. 2017) (see *Section 6.3 Socio-Economic Research Needs*).

1.5.2.1 Striped Bass Fisheries and the Economy

A 2019 report from Southwick Associates[3] indicates 97% of the economic impacts associated with striped bass fishing came from the recreational sector in 2016. According to the report, total revenues in the commercial sector (from Maine to North Carolina) were $19.8 million that year, while total expenditures in the recreational sector amounted to $6.3 billion. The contribution of the commercial sector to the region's gross domestic product (GDP), when attempting to account for all industries involved in harvesting, processing, distributing, and retailing striped bass to consumers, was $103.2 million and supported 2,664 regional jobs. In comparison, the contribution of the recreational sector to the region's GDP was $7.7 billion and supported 104,867 jobs. Importantly, the report acknowledges that it is not intended to be used to set fishery regulations, but rather to demonstrate the economic significance of striped bass to local economies. It should also be noted that these numbers are for the entire region and actual economic impacts are expected to vary by state.

The dollar values above refer to economic impacts, not to the economic value (or net economic benefit for society) associated with the recreational and commercial fisheries. While data required to quantify these measures are not currently available, the effects of changes to the striped bass management program for recreational sector can be qualified as follows: further limitations on the size and number of fish that can be kept can lead to increased effort to retain a legal-sized fish and an increase in dead releases. Conversely, increased fishing restrictions could result in a reduction in number of recreational trips which could translate into a reduction in angler welfare. However, as in the case of the economic impacts (and assuming increased restrictions do not permanently deter stakeholders from the striped bass fishery), these effects are expected to be outweighed by the positive effects on anglers', harvesters', and consumers' welfare associated with stock recovery in successive years.

2.0 GOALS AND OBJECTIVES

2.1 HISTORY OF MANAGEMENT

Atlantic striped bass (*Morone saxatilis*) have supported valuable commercial and recreational fisheries on the U.S. Atlantic coast for centuries. The Commission coordinates interstate management of the species in state waters (0-3 miles from shore), while management authority in the exclusive economic zone (3-200 miles) lies with NMFS. The first Interstate FMP for the species was approved in 1981 in response to poor juvenile recruitment and declining

[3] While this is a useful source of updated information, it is not peer-reviewed and, therefore, the methods behind the report's figures should be considered accordingly.

landings. The FMP recommended increased restrictions on commercial and recreational fisheries, such as minimum size limits and harvest closures on spawning grounds. Two amendments were passed in 1984 recommending additional management measures to reduce fishing mortality. To strengthen the management response and improve compliance and enforcement, the Atlantic Striped Bass Conservation Act (P.L. 98-613) was passed in late 1984. The Striped Bass Act mandated the implementation of striped bass regulations passed by the Commission and gave the Commission authority to recommend to the Secretaries of Commerce and Interior that states be found out of compliance when they failed to implement management measures consistent with the FMP.

The first enforceable plan under the Striped Bass Act, Amendment 3, was approved in 1985, and required size regulations to protect the 1982 year class—the first modest size cohort since the previous decade. The objective was to increase size limits to allow at least 95% of the females in the 1982 year class to spawn at least once. Smaller size limits were permitted in producer areas than along the coast. Several states opted for a more conservative approach and imposed a total moratorium on striped bass landings for several years. The amendment contained a trigger mechanism to relax regulations when the 3-year moving average of the Maryland juvenile abundance index (JAI) exceeded an arithmetic mean of 8.0. This was attained with the recruitment of the 1989 year class and led to the development of Amendment 4. Also, in 1985, the Commission determined the Albemarle Sound-Roanoke River (Albemarle-Roanoke) stock in North Carolina contributed minimally to the coastal migratory population, and was therefore allowed to operate under an alternative management program.

Amendment 4, implemented in 1989, aimed to rebuild the resource rather than maximize yield. The amendment allowed state fisheries to reopen under an interim target fishing morality (F) of 0.25, which was half the estimated F needed to achieve maximum sustainable yield (MSY). The amendment would allow an increase in the target F (0.5) once female SSB was restored to levels estimated during the late 1960s and early 1970s. The dual size limit concept was maintained (28” coastal versus 18” producer areas), and a recreational trip limit and commercial season was implemented to reduce the harvest to 20% of that during 1972-1979. A series of four addenda were implemented from 1990-1994 to maintain protection of the 1982 year class through sequentially higher minimum size limits which reached 34” along the coast by 1994.

In 1990, to provide additional protection to striped bass and ensure the effectiveness of state regulations, NMFS adopted a prohibition on possession, fishing (catch and release fishing), harvest, and retention of Atlantic striped bass in the Exclusive Economic Zone (EEZ), with the exception of a defined transit zone within Block Island Sound (55 Federal Register 40181-02). Atlantic striped bass may be transported through this defined area provided that the vessel is not used to fish while in the EEZ and the vessel remains in continuous transit, and that the fish were legally caught in adjoining state waters. The EEZ has remained closed since 1990. In addition, an Executive Order issued in 2017 prohibits the sale of striped bass caught from the EEZ.

In 1995, the Atlantic striped bass migratory stock was declared recovered by the Commission (the Albemarle-Roanoke stock was declared recovered in 1997 and the Delaware River stock was declared recovered in 1998) and Amendment 5 was adopted to increase the target F to 0.33, midway between the existing F target (0.25) and F_{MSY}. Target F was allowed to increase again to 0.40 after two years of implementation. Regulations were developed to achieve the target fishing mortality, which included measures to restore commercial harvest to 70% of the average landings during the 1972-1979 historical period, and recreational season, possession (two fish), and size limits (a return to 28" on the coast and 20" for producer areas). States were allowed to submit proposals to implement alternative regulations that were deemed conservationally equivalent to the Amendment 5 measures, provided no size limits were below 18". From 1997-2000[4], a series of five addenda were implemented to respond to the latest stock status information and adjust the regulatory program to achieve each change in target F.

In 2003, Amendment 6[5] was adopted to address five limitations within the existing management program: 1) potential inability to prevent the Amendment 5 exploitation target from being exceeded; 2) perceived decrease in availability or abundance of large striped bass in the coastal migratory population; 3) a lack of management direction with respect to target and threshold biomass levels; 4) inequitable effects of regulations on the recreational and commercial fisheries, and coastal and producer area sectors; and 5) excessively frequent changes to the management program.

Amendment 6 modified the F target and threshold, and introduced a new set of biological reference points (BRPs) based on female SSB, as well as a list of management triggers based on the BRPs. The F threshold value was set to achieve MSY and the F target was set to provide a higher long-term yield from the fishery and adequate protection to ensure that the striped bass population is not reduced to a level where the spawning potential is adversely affected. The F target provided a buffer to account for the uncertainty in the estimate of F_{MSY} threshold. The female SSB threshold value was set equal to the female SSB value in 1995, the year that the striped bass stock was declared rebuilt, while the SSB target was set to 125% of the SSB threshold. New management measures were selected based on the F target.

[4] The 1997 reauthorization of the Striped Bass Act also required the Secretaries of Commerce and Interior provide a biennial report to Congress highlighting the progress and findings of studies of migratory and estuarine Striped Bass. The tenth such report was recently provided to Congress (Shepherd et al. 2020).

[5] While NMFS continues to implement a complete ban on the fishing and harvest of striped bass in the EEZ, Amendment 6 includes a recommendation to consider reopening the EEZ to striped bass fisheries. In September 2006, NMFS concluded that it would be imprudent to open the EEZ to striped bass fishing because it could not be certain that opening the EEZ would not lead to increased effort and an overfishing scenario. In 2018, the Consolidated Appropriations Act directed NMFS (in consultation with ASMFC) to review the federal moratorium once the 2018 benchmark was completed, and consider lifting the ban, however, there has not been any update from NMFS on this directive.

The coastal commercial quotas were restored to 100% of the states' average landings during the 1972-1979 historical period, except for Delaware's coastal commercial quota which remained at the level allocated in 2002[6]. For the recreational fisheries, a two-fish bag limit with a minimum size limit of 28 inches was established, except for the Chesapeake Bay fisheries and North Carolina fisheries that operate in the Albemarle-Roanoke. The Chesapeake Bay and Albemarle-Roanoke regulatory programs were predicated on a more conservative F target than the coastal migratory stock, which allowed these states/jurisdictions (hereafter states) to implement separate seasons, harvest caps, and size and bag limits as long as they remained under that F target. Additionally, states were permitted the flexibility to deviate from the coastwide regulations by submitting conservation equivalency proposals. No minimum size limit could be less than 18 inches under Amendment 6. The same minimum size standards regulated the commercial fisheries as the recreational fisheries, except for a minimum 20 inch size limit in the Delaware Bay spring American shad gillnet fishery.

Five addenda to Amendment 6 have been implemented. Addendum I, approved in 2007, established a bycatch monitoring and research program to increase the accuracy of data on striped bass discards and recommended development of a web-based angler education program. Addendum II was approved in 2010 and established a new definition of recruitment failure such that each index would have a fixed threshold rather than a threshold that changes annually with the addition of each year's data. Addendum III was approved in 2012 and requires all states with a commercial fishery for striped bass to implement a uniform commercial harvest tagging program. The Addendum was initiated in response to significant poaching events in the Chesapeake Bay and aims to limit illegal harvest of striped bass.

Addendum IV was triggered in response to the 2013 benchmark assessment, which indicated a steady decline in SSB since the mid-2000s to the point of approaching the SSB threshold in the terminal year. The Addendum established new F reference points, including the elimination of Chesapeake Bay stock-specific reference points due to modeling limitations, and changed commercial and recreational measures to reduce F to a level at or below the new target. While the 1995 female SSB level had proved to be a useful reference point for striped bass, fishing at (and even below) the F_{MSY} target reference point did not maintain female SSB at the 1995 level. To address this issue, the 2013 benchmark stock assessment recommended new F reference points that would maintain SSB at or above its 1995 level which Addendum IV adopted. Chesapeake Bay fisheries were required to implement lower reductions than coastal states (20.5% compared to 25%) since their fisheries were reduced by 14% in 2013 based on their management program; however, this included replacing the Bay's variable commercial harvest cap (based on exploitable biomass) with a fixed level based on reducing 20.5% from the 2021 harvest. Along the coast, the measures included 25% coastal commercial quota reductions and

[6] The decision to hold Delaware's commercial quota at the 2002 level was based on tagging information that indicated F on the Delaware River/Bay stock was too high, and uncertainty regarding the status of the spawning stock for the Delaware River/Bay.

a 1-fish limit and 28" minimum size for recreational fisheries. The addendum maintained the flexibility to implement alternative regulations through the conservation equivalency process, which resulted in some variety of regulations among states. All states promulgated regulations prior to the start of their 2015 seasons.

In February 2017, the Board initiated development of Draft Addendum V to consider liberalizing coastwide commercial and recreational regulations. The Board's action responded to concerns raised by Chesapeake Bay jurisdictions regarding continued economic hardship endured by its stakeholders since the implementation of Addendum IV and information from the 2016 stock assessment update indicating that F was below target in 2015, and that total removals could increase by 10% to achieve the target F. However, the Board chose to not advance the draft addendum for public comment largely due to harvest estimates having increased in 2016 without changing regulations. Instead, the Board decided to wait until it reviewed the results of the 2018 benchmark stock assessment (NEFSC 2019) before considering making changes to the management program.

Addendum VI was initiated in response to the 2018 benchmark assessment which indicated the stock was overfished and experiencing overfishing in 2017. Approved in October 2019, the Addendum aims to reduce total removals by 18% relative to 2017 levels in order to achieve the F target in 2020 and begin rebuilding the stock. Specifically, the Addendum reduces all state commercial quotas by 18%, and implements a 1 fish bag limit and a 28"to less than 35" slot limit for ocean fisheries and a 1 fish bag limit and an 18" minimum size limit in Chesapeake Bay to reduce total recreational removals by 18% in both regions. The Addendum's measures are designed to apply the needed reductions proportionally to both the commercial and recreational sectors, although states were permitted to submit alternative regulations through conservation equivalency that achieve an 18% reduction in total removals statewide. The Board reviewed and approved management options for 2020 on a state-by-state basis in February, and all states promulgated regulations by April 1 (Tables 12-13).

Addendum VI also requires the mandatory use of circle hooks when fishing with bait to reduce release mortality in recreational striped bass fisheries. States are encouraged to promote the use of circle hooks through various public outreach and education platforms to garner support and compliance with this important conservation measure. Circle hook regulations were required to be implemented no later than January 1, 2021. In March 2021, the Board approved a clarification on the definition of bait and methods of fishing that require circle hooks. The Board also approved guidance on how to address incidental catch of striped bass when targeting other species with non-circle hooks with bait attached.[7]

[7] This guidance on incidental catch could not be implemented as a compliance criterion since incidental catch was not originally part of Addendum VI.

2.2 PURPOSE AND NEED FOR ACTION

The purpose of Amendment 7 is to update the management program to align with current fishery needs and priorities given the status and understanding of the resource and fishery has changed considerably since implementation of Amendment 6 in 2003. The Board intends for this amendment to build upon the Addendum VI action to end overfishing and initiate rebuilding in response to the overfished status.

The Board-approved 2018 benchmark stock assessment indicated the striped bass stock is overfished and experiencing overfishing relative to the updated reference points defined in the assessment. By accepting the assessment for management use in 2019, two management triggers were tripped requiring the Board to take action to address both the overfishing and overfished status. Addendum VI was implemented in 2020 to address the overfishing status by implementing measures to reduce fishing mortality back to the fishing mortality target in 2020. To address the overfished status, the Board must adjust the striped bass management program to rebuild the biomass to the target level by no later than 2029 (within 10 years). Addendum VI measures are expected to contribute to stock rebuilding.

This draft amendment presents options that would contribute to stock rebuilding and would update the management program to address concerns raised by the Board and the public (see *Section 1.1.1 Statement of the Problem*). For the recreational fishery, this amendment considers management measures to address recreational release mortality. Regarding management program processes, this amendment considers options to modify the use of conservation equivalency in the Striped Bass FMP and options to modify the management triggers established through Amendment 6. Regarding the rebuilding plan, this amendment considers options for how recruitment assumptions would be applied to the rebuilding calculations and projections in the next stock assessment update (expected in 2022). Besides these five issues, all other management measures are consistent with Amendment 6 and its Addenda; however, other issues can be addressed in a separate management document(s) following approval of the final amendment (see *Section 4.7 Adaptive Management*).

2.3 GOAL

The Goal of Amendment 7 to the Interstate Fishery Management Plan for Atlantic Striped Bass is:

> To perpetuate, through cooperative interstate fishery management, migratory stocks of striped bass; to allow commercial and recreational fisheries consistent with the long-term maintenance of a broad age structure, a self-sustaining spawning stock; and also to provide for the restoration and maintenance of their essential habitat.

2.4 OBJECTIVES

In support of this goal, the following objectives are specified:

1. Manage striped bass fisheries under a control rule designed to maintain stock size at or above the target female spawning stock biomass level and a level of fishing mortality at or below the target exploitation rate.
2. Manage fishing mortality to maintain an age structure that provides adequate spawning potential to sustain long-term abundance of striped bass populations.
3. Provide a management plan that strives, to the extent practical, to maintain coastwide consistency of implemented measures, while allowing the States defined flexibility to implement alternative strategies that accomplish the objectives of the FMP.
4. Foster quality and economically viable recreational, for-hire, and commercial fisheries.
5. Maximize cost effectiveness of current information gathering and prioritize state obligations in order to minimize costs of monitoring and management.
6. Adopt a long-term management regime that minimizes or eliminates the need to make annual changes or modifications to management measures.
7. Establish a fishing mortality target that will result in a net increase in the abundance (pounds) of age 15 and older striped bass in the population, relative to the 2000 estimate.

2.5 MANAGEMENT UNIT

The management unit includes all coastal migratory striped bass stocks on the East Coast of the United States, excluding the Exclusive Economic Zone (3-200 nautical miles offshore), which is managed separately by NMFS. The coastal migratory striped bass stocks occur in the coastal and estuarine areas of all states and jurisdictions from Maine through North Carolina. Inclusion of these states in the management unit is also congressionally mandated in the Atlantic Striped Bass Conservation Act (PL 98-613).

2.5.1 Chesapeake Bay Management Area

The Chesapeake Bay management area is defined by the striped bass residing between the baseline from which the territorial sea is measured as it extends from Cape Henry to Cape Charles to the upstream boundary of the fall line. Unlike the Albemarle Sound-Roanoke River stock, the striped bass in the Chesapeake Bay are unquestionably part of the coastal migratory stock and are assessed as part of the coastal migratory striped bass management unit. However, Amendment 7 implements a separate management program for the Chesapeake Bay due to the size availability of striped bass in this area.

2.5.2 Albemarle Sound-Roanoke River Management Area

The Albemarle Sound-Roanoke River (Albemarle-Roanoke) stock is currently assessed and managed separately by the State of North Carolina under the auspices of ASMFC.[8] The Albemarle-Roanoke management area is defined by the striped bass inhabiting the Albemarle, Currituck, Croatan, and Roanoke Sounds and their tributaries, including the Roanoke River. The Virginia/North Carolina line bound these areas to the north and a line from Roanoke Marshes Point to the Eagle Nest Bay bounds the area to the south. The Bonner Bridge at Oregon Inlet defines the ocean boundary of the Albemarle-Roanoke management area.

The Albemarle-Roanoke stock is not included in the coastwide assessment and management program because it contributes minimally to the coastal migratory stock. The Albemarle-Roanoke stock is smaller in total abundance relative to the other producer areas and does not participate in the coastal migration until older ages. The female maturation schedule for the Albemarle-Roanoke stock is also different than the Chesapeake Bay stock (ASMFC 2013; NCDMF 2014). The Technical Committee will continue to monitor the contribution of the Albemarle-Roanoke stock to the coastal migratory population and make recommendations to the Management Board regarding future management.

2.6 REFERENCE POINTS

The current status of the Atlantic striped bass stock will be determined with respect to its biological reference points through the stock assessment. Amendment 7 maintains the previously existing reference point definitions from Amendment 6, as modified by Addendum IV, for female spawning stock biomass (SSB) and fishing mortality rate (F).

2.6.1 Definition of Overfishing and Overfished

A common approach in fisheries management for evaluating the need for management action as determined by stock status is through the use of a control rule. For striped bass, the control rule is based on the level of: 1) fishing mortality rate (F) and 2) female spawning stock biomass (SSB). Overfishing is defined relative to the rate of removals from the population, as determined by the fishing mortality on the stock, whereas overfished status is defined relative to female SSB. For striped bass, the threshold levels of F and SSB are used to determine overfishing and overfished status, respectively. If F exceeds the F threshold, overfishing is occurring, and if SSB falls below the SSB threshold, the stock is overfished.

[8] Estuarine striped bass in North Carolina are currently managed under Amendment 1 to the North Carolina Estuarine Striped Bass Fishery Management Plan (FMP) and its subsequent revision and recent supplement (NCDMF 2013, 2014, 2019). It is a joint plan between the North Carolina Marine Fisheries Commission (NCMFC) and the North Carolina Wildlife Resources Commission (NCWRC).

The management program is designed to achieve the target F and SSB levels. The use of fishing mortality and spawning stock biomass targets and thresholds will provide managers with a series of factors to use when evaluating the status of the stock. *Section 4.1* outlines a series of management triggers associated with the targets and thresholds.

The following sections identify SSB and F reference points for the coastwide population, which includes the Chesapeake Bay, Hudson River and Delaware River/Bay as a metapopulation. These reference points are consistent with those accepted in the Striped Bass 2018 Benchmark Assessment and Peer Review (NEFSC 2019).

Additional work is being conducted by the TC and SAS to develop management area-based reference points (e.g., for the Chesapeake Bay) for future Board consideration.

2.6.1.1 Female Spawning Stock Biomass Target and Threshold

The biomass target and threshold are based on the weight of sexually mature females in the striped bass population. The 1995 estimate of female SSB is used as the SSB threshold because many stock characteristics, such as an expanded age structure, were reached by this year, and this is also the year the stock was declared recovered. The female SSB target is equal to 125% of the female SSB threshold. Based on the results from the 2018 assessment, the SSB threshold is 91,436 metric tons (202 million pounds) and the SSB target is 114,295 metric tons (252 million pounds) (Table 1). Female SSB target and threshold values will be updated with future stock assessments because these reference point values are estimated based on the best available data.

The striped bass population will be considered overfished when the female SSB falls below the SSB threshold level. *Section 4.1* outlines management triggers based on female SSB reference points.

The use of the word “target” is not intended to imply that the management program will try to limit the population from expanding beyond the target level. In other words, when the population is above the target it is not the intent to reduce the population back to target levels.

2.6.1.2 Fishing Mortality Target and Threshold

Fishing mortality based reference points are designed to manage the rate at which individual striped bass die because of fishing. The fishing mortality target and threshold are the values of F estimated to achieve the respective SSB target and threshold over the long-term. If the current F exceeds the F threshold, then overfishing is occurring. This means the rate at which striped bass are dying because of fishing (i.e., harvest and dead discards) exceeds the stock’s ability to maintain itself at the SSB threshold. The value of the F target is set at a cautionary level

intended to safeguard the fishery from reaching the overfishing threshold.[9] The F target and threshold values will be updated with future stock assessments because these reference point values are estimated based on the best available data.

Section 4.1 outlines management triggers based on the F reference points.

Table 1. Coastwide Population Reference Points

Reference Point	Definition	Value (as estimated in 2018 benchmark stock assessment)*
$SSB_{THRESHOLD}$	SSB in 1995	202 million pounds
SSB_{TARGET}	125% of SSB in 1995	252 million pounds
$F_{THRESHOLD}$	F associated with achieving the SSB threshold	0.24
F_{TARGET}	F associated with achieving the SSB target	0.20

*The target and threshold values may change through future stock assessments because they are estimated based on the best available data.

2.6.1.3 Reference Points for the Albemarle Sound-Roanoke River

The State of North Carolina will manage the Albemarle Sound-Roanoke River stock using reference points from the latest North Carolina Albemarle Sound-Roanoke River stock assessment accepted by the Technical Committee and approved for management use by the Board (Figures 8-9). The recreational and commercial fisheries in the Albemarle Sound and Roanoke River will operate under North Carolina's Fishery Management Plan while the recreational and commercial fisheries in the Atlantic Ocean will continue to operate under the Commission's management measures as the rest of the coastal fisheries.

2.7 STOCK REBUILDING PROGRAM

2.7.1 Stock Rebuilding Targets

Should the Atlantic striped bass population be overfished at any time, it is the intent under Amendment 7 to rebuild the female spawning stock biomass to the target level (defined in *Section 2.6.1.1*) within the timeframe established in *Section 2.7.2*.

2.7.2 Stock Rebuilding Schedules

If at any time the Atlantic striped bass population is declared overfished and rebuilding needs to occur (as specified in *Section 4.1 Management Triggers*), the Management Board will

[9] F reference points are calculated by the stock assessment model, which includes incorporating recruitment from the values observed from 1990 to the terminal year of the assessment. If an alternative recruitment management trigger is selected from *Section 4.1,* an interim F target and threshold may be calculated based on recruitment values from a low recruitment time period only, as specified in *Section 4.1*.

determine the rebuilding schedule at that time. The only limitation imposed under Amendment 7 is that the rebuilding schedule is not to exceed 10 years.

2.7.3 Maintenance of Stock Structure

Using the outputs from the stock assessment model, the Technical Committee will monitor the status of the age structure in the striped bass population. If the Technical Committee identifies a persistent change in the age structure that could jeopardize recruitment then the Management Board could modify the exploitation pattern to increase survival of target age classes. In addition, if an individual stock exceeds threshold limits for biomass or exploitation the Board should consider management changes for that stock.

3.0 MONITORING PROGRAM SPECIFICATION

In order to achieve the goals and objectives of Amendment 7, the collection and maintenance of quality data is necessary. All state fishery management agencies are encouraged to pursue full implementation of the standards of the Atlantic Coastal Cooperative Statistics Program (ACCSP).

3.1 COMMERCIAL CATCH AND LANDINGS INFORMATION

States and jurisdictions with commercial striped bass fisheries are required to collect commercial fishery data elements consistent with ACCSP standards and adhere to the ACCSP standard of mandatory trip-level reporting for catch and effort data collection. These data are used to support commercial quota monitoring efforts to prevent annual quota overages. Commercial quotas are allocated on a calendar year basis with quota monitoring being conducted annually during the Fishery Management Plan Review process based on landings information submitted in state compliance reports. States also conduct quota monitoring during the fishing season. Any overages incurred by a state or jurisdiction is deducted from that state or jurisdictions allowable quota in the following year.

3.1.1 Commercial Tagging Program

States and jurisdictions are required to implement a tagging program for all commercially harvested striped bass within state or jurisdictional waters. Further descriptions of the program requirements are provided in the following sections.

Tag Information and Type

All states and jurisdictions with a commercial striped bass fishery are required to submit a Commercial Tagging Report to ASMFC no later than 60 days prior to the start of the first commercial fishery in that state or jurisdiction. The Commercial Tagging Report will include a picture of the tag(s), as well as a description of the tag color, style, and inscription for all gears and/or seasons issued. Additionally, it should include the number of tags issued or printed and a description of the biological metric used to determine the number of tags printed and distributed to participants. All tags used in a state or jurisdictions tagging program must be

tamper-evident. Tags are required to be valid for only one year or fishing season. Tags are required to be inscribed with, at a minimum, the year of issue, the state of issue, and a unique number that can be linked back to the permit holder. Where possible, tags should also be inscribed with size limit. States should consider the use of bar codes or QR codes imprinted on tags, for use in tracking fish from harvester to dealer to buyer, as the technology becomes more available. Changes to the tags, with the exception of year, are required to be reported to ASMFC as specified in *Section 5.3*.

Tag Timing

States or jurisdictions with a commercial striped bass fishery may choose to implement their commercial tagging program at either the point of harvest or the point of sale.

Tag Allowance

States and jurisdictions with a commercial striped bass fishery are required to allocate commercial tags to permit holders based on a biological metric. This option is intended to help prevent state or jurisdictional commercial quota overages, which will contribute to the health and sustainability of the striped bass population. The biological metric used to allocate tags to participants is required to be included in the annual Commercial Tag Report.

Tag Accounting

States and jurisdictions with a commercial striped bass fishery must require permit holders to turn in unused tags or provide an accounting report for any unused tags prior to the start of the next fishing season. Tags or the accounting report shall be turned into the agency issuing the tags. The accounting report must include the disposition of all tags issued to the permittee (e.g., used, unused, broken, lost). Permit holders who do not comply with this section may be subject to penalties as set forth below.

Reporting for Tagging Program

States and jurisdictions with a commercial striped bass fishery shall, at a minimum, approve the ACCSP standards for catch and effort data collection. The ACCSP standard for commercial catch and effort data is mandatory, trip-level reporting of all species commercially harvested with reporting of specific minimum data elements; including species, quantity, state and port of landing, market grade and category, areas fished and hours fished. Dealers and/or harvesters landing catches must report to the state of landing monthly or more frequently, if possible. Each gear and area combination should be detailed; such as separate listings each time the fisherman changes gear or fishing area within a trip. Price data are preferred at the trip-level, but partners may opt to collect prices through dealer surveys.

Striped Bass Processing

For all commercial striped bass tagging programs, tags must remain affixed to the fish until processed for consumption by the consumer. Retail markets may prepare portions of legally tagged striped bass for the consumer but must retain the tagged carcass until all portions are sold. The tag must then be removed from the rack and destroyed (e.g. by cutting the tag in two). Possession of untagged striped bass or striped bass fillets or steaks without the properly

tagged carcass in establishments where fish are sold or offered for sale (including wholesale establishments, retail establishments and restaurants) is presumptive evidence of intent to sell, trade, or barter such striped bass.

Striped Bass Exportation

It is unlawful to sell or purchase commercially caught striped bass without a commercial tag. This is to prevent the sale or purchase of untagged striped bass into a state or jurisdiction where there is currently no commercial fishery program.

Penalties

It is recommended that states and jurisdictions strengthen their penalties for striped bass violations, including counterfeit tag operations, so that the penalties are sufficient to deter illegal harvest of striped bass. License revocation or suspension is supported as a primary penalty for state or federal violations. Civil and/or criminal penalties can be effective deterrents.

It is recommended that if the permit holder issued tags cannot account for unused commercial striped bass tags, then that individual will not be issued a commercial striped bass permit for the subsequent fishing year.

3.2 RECREATIONAL CATCH AND LANDINGS INFORMATION

The Marine Recreational Information Program (MRIP) contains estimated Atlantic striped bass catches starting in 1981 for shore, private/rental boats, and for-hire modes. Recreational harvest of striped bass was previously collected through the Marine Recreational Fisheries Statistics Survey (MRFSS), which was a recreational data collection program used from 1981-2003. The MRFSS program was replaced by MRIP in 2004 and was designed to provide more accurate and timely reporting as well as greater spatial coverage. The MRFSS and MRIP programs were simultaneously conducted in 2004-2006 and this information was used to calibrate past MRFSS recreational harvest estimates against MRIP recreational harvest estimates.

In 2018, MRIP implemented the Fishing Effort Survey (FES) which used an improved methodology to address several concerns with the prior Coastal Household Telephone Survey. These concerns included under-coverage of the angling public, declining number of households with landline telephones, reduced response rates, and memory recall issues. Past estimates have been recalibrated to the FES. This calibration resulted in much higher recreational catch estimates compared to previous estimates. The 2018 striped bass benchmark assessment incorporated these newly calibrated MRIP estimates.

Recreational catches of striped bass were downloaded from https://www.fisheries.noaa.gov/data-tools/recreational-fisheries-statistics-queries using the query option.

A description of MRIP survey methods can be found online: https://www.fisheries.noaa.gov/recreational-fishing-data/types-recreational-fishing-surveys#access-point-angler-intercept-survey.

3.3 SOCIAL AND ECONOMIC COLLECTION PROGRAMS

Data on a number of variables relevant to social and economic dimensions of striped bass fisheries are collected through existing ACCSP data collection programs and MRIP; however, no explicit mandates to collect socioeconomic data for this species currently exist. In addition to landed quantities, commercial harvesters and dealers may report ex-vessel prices or value, fishing and landing locations, landing disposition, and a variety of measures capturing fishing effort. MRIP regularly collects information on recreational fishing effort and landings, and occasionally gathers socioeconomic data on angler motivations and expenditures.

3.4 BIOLOGICAL DATA COLLECTION PROGRAM

3.4.1 Fishery-Dependent Data Collection

Required fishery-dependent data collection programs are as follows:

1. Catch composition information will be gathered by those states/jurisdictions with commercial fisheries (currently Massachusetts, Rhode Island, New York, Delaware, Maryland, Virginia, Potomac River Fisheries Commission, and North Carolina) and by those states with significant recreational fisheries (Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Maryland, Virginia, and the Potomac River Fisheries Commission). Samples shall be representative of location and seasonal distribution of catch, and appropriate biological data shall be collected.

2. Representative catch and effort data will be gathered by those states with significant commercial fisheries (currently Massachusetts, New York, Delaware, Maryland, Virginia, and the Potomac River Fisheries Commission) and by those agencies monitoring recreational fisheries (National Marine Fisheries Service, Rhode Island, Connecticut, New York, New Jersey, Maryland, Virginia, and the Potomac River Fisheries Commission).

3. Striped bass tagging programs currently executed by the U.S. Fish and Wildlife Service, National Marine Fisheries Service, Southeastern Monitoring and Assessment Program, Massachusetts Division of Marine Fisheries, New York Department of Environmental Conservation, New Jersey Department of Environmental Protection, Maryland Department of Natural Resources, Virginia Marine Resources Commission, and North Carolina Division of Marine Fisheries will be continued to generate estimates of migration and mortality rates.

   Appendix 1 summarizes required fishery-dependent data collection.

3.4.2 Fishery-Independent Data Collection

3.4.2.1 Young-of-Year (YOY) Surveys

Annual juvenile recruitment (appearance of juveniles in the ecosystem) of striped bass which comprise the Atlantic Coast migratory population is measured in order to provide an indication of future stock abundance. When low numbers of juvenile fish (age 0) are produced in a given year, recreational and commercial catches from that year class may be lower four years later when surviving fish become available to the fisheries. Recruitment is measured by sampling current year juvenile fish abundance in nursery areas. Currently, these juvenile abundance indices are determined annually for stocks in the Kennebec River, Hudson River, Delaware River, Chesapeake Bay and its tributaries, and Albemarle Sound-Roanoke River. Since there is a time delay of several years between the measurement of recruitment and initial harvest of those fish, managers have ample time to protect year classes that have not yet been exploited.

The juvenile abundance index values for the Hudson River, Delaware River, Chesapeake Bay and its tributaries serve as input to the assessment model. Juvenile abundance indices can also serve as another indicator of the status, and future status, of the striped bass population. Recruitment failure is defined as an index value that is below 75% of all values in a fixed time series appropriate to each juvenile abundance index. The fixed time series for determining recruitment failure are as follows:

State JAI	Water Body	Reference Period
ME	Kennebec River	1987-2009
NY	Hudson River	1985-2009
NJ	Delaware River	1986-2009
MD	Chesapeake Bay	1957-2009
VA	Chesapeake Bay	1980-2009
NC	Albemarle-Roanoke	1955-2009

The following states are currently required to conduct juvenile abundance index surveys on an annual basis: Maine for the Kennebec River; New York for the Hudson River; New Jersey for the Delaware River; Maryland for the Chesapeake Bay tributaries; Virginia for Chesapeake Bay tributaries; and North Carolina for the Albemarle Sound-Roanoke River.

The requirements for measurement of juvenile indices are as follows:

1. The sampling protocol (stations, sampling intensity and gear type) shall be consistent throughout the period for which the index is to be used. For new indices, the following information will be required: details of the sampling design of the study yielding the data used to develop the index; a description of the analyses performed; and a presentation of the results of those analyses. The Technical Committee shall review any such submittal and either accept or reject it. If rejected, the Committee will provide a written explanation to the sponsor explaining the reasons for rejection.

2. In order to be validated, the index should exhibit a significant ($p<0.05$) positive correlation to either the magnitude of future landings (lagged 2-7 years) from the stock, or to the relative abundance of the same year class later in life (i.e., relative abundance of juveniles versus the relative abundance of yearling fish of the same year class).

3. The Management Board may require juvenile abundance surveys in additional river systems to evaluate the level of striped bass productivity.

4. The Technical Committee shall annually examine trends in all required juvenile abundance index surveys and evaluate index values against the recruitment trigger, as defined in *Section 4.1*.

   Appendix 1 summarizes required juvenile abundance index surveys.

3.4.2.2 Spawning Stock Biomass Surveys

Spawning stock surveys are required to be monitored in each of the following areas: Hudson River, Delaware River, Chesapeake Bay, and Albemarle Sound-Roanoke River.

The requirements for monitoring spawning stock biomass are as follows:

1. The Technical Committee shall examine output from the stock assessment model when stock assessment benchmarks or updates are conducted and use those estimates to evaluate the status of the striped bass stock relative to the female spawning stock biomass targets and thresholds in this Amendment.

2. Jurisdictions bordering the Hudson River, Delaware River, Chesapeake Bay, and Albemarle Sound/Roanoke River (currently New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, and North Carolina) shall be responsible for conducting spawning stock assessment surveys in those river systems. Accepted studies for fulfilling this requirement currently include: **New York**: Hudson River haul seine survey and shad by-catch analysis; **Maryland**: Gill net surveys; **Virginia**: spring pound net survey; **North Carolina**: spring electroshocking survey of spawning stock; **Pennsylvania-New Jersey-Delaware**: Delaware River electroshocking/gill net survey. Any changes to the survey methodology must be reviewed by the Technical Committee and approved by the Management Board prior to implementation.

   Appendix 1 summarizes required spawning stock biomass surveys.

3.4.2.3 Observer Programs

As a condition of state and/or federal permitting, many vessels are required to carry at-sea observers when requested. A minimum set of standard data elements are to be collected through the ACCSP at-sea observer program (refer to the ACCSP Program Design document for details). Specific fisheries priorities will be determined by the Discard/Release Prioritization Committee of ACCSP.

3.4.2.4 Tagging Studies/Program

Tagging of fish with individually-numbered tags is a proven technique for determining movement and migration routes and rates, growth rates and patterns, estimation of mortality/survival, estimation of population size (if assumptions are met), stock identification and determination of movement/migration corridors and habitat use. The use of more sophisticated electronic tags can provide additional habitat information such as temperature (of both water and fish body), depth and specific location. The species' Advisory Panel, Stock Assessment Subcommittee, Technical Committee and/or Management Board (for ASMFC), Advisory Panel or Committee (for Fishery Management Councils) and working groups for International Fisheries Commissions may decide to recommend that tagging studies be performed. Alternatively, such studies may be initiated independently by one or more of the partners in the fishery management process.

Fish tagging is a technical activity which is usually conducted by scientific personnel; however a number of other entities have become involved in or conducted their own tagging studies. If a new tagging study is proposed for striped bass, a number of considerations should be addressed. Any proposed study must have stated objectives, which directly relate to scientific or management purposes. A second important consideration is whether a species can be tagged with minimal mortality, as the utility of study data will be highly questionable if handling/tagging mortality is high. The ideal tag should be one which has a unique alpha-numeric identifier and organization contact information, is easily implanted, has a high rate of retention, is readily visible to potential recoverers without increasing an animal's susceptibility to predation, and remains permanently legible, or in the case of internally-embedded coded wire (CWT) or passive integrated transponder (PIT) tags, is easily and consistently detectable. The implantation location and type of CWT or PIT tags should be fully coordinated with other investigators tagging the same species. Tag number sequences and colors of externally visible tags should be coordinated with other investigators conducting similar studies, via the Interstate Tagging Committee, to ensure that duplication does not occur, and contact information for recoveries and returns should be clearly imprinted on the tag. Tagging should be conducted in a consistent manner by personnel who have been properly trained. Consideration should be given to requiring certification of both professional staff and volunteer angler taggers by the sponsoring organization, in order to increase both the efficiency of tagging and the survival of tagged fish through minimization of handling/tagging mortality. The ASMFC Interstate Tagging Committee has developed a certification for tagging programs, for which sponsoring organizations may wish to apply.

Tagging studies should be highly publicized among the fishing public to maximize the rate of return from both commercial and recreational sectors. In most cases, efforts should be undertaken to accurately measure the rate of tag encounter and reporting. Ideally each study conducted should assess short-term tagging (handling) mortality; short and long-term tag loss; and reporting rates for each fishery sector. Advertised/promised rewards should be provided promptly upon receipt of data. Study managers should insist on complete and accurate return information. Numbers of animals tagged should be sufficiently high to ensure that the desired information will be produced by the study. Careful and appropriate study design (i.e., purpose,

location, sample size, duration, recapture procedures, analysis) is vital to ensure success. Prior to study implementation, a repository for any resultant data should be specified, and long-term commitments made by the sponsoring program, and resources made available to analyze and publish the results. Funds should be provided/reserved to process recaptured tagged fish reported after the program has ended. In angler programs, participants with tagging kits should be notified when the program has ended. All incoming tagging data should be added to the existing database until no additional data are received. Failure to respond to reports of recaptured fish will be detrimental to surrounding tagging programs. Tag reporting apathy develops in anglers when they do not receive replies from the tagging entity.

Investigators may wish to consider collaboration with existing tag database managers (e.g. NMFS Northeast Fishery Science Center, Woods Hole, MA; or U.S. Fish and Wildlife Service, Fishery Resources Office, Annapolis, MD; Atlantic States Marine Fisheries Commission, 1050 N Highland Ave, Suite 200 A-N, Arlington, VA 22201, 703-842-0740, info@asmfc.org) for data entry and analysis. Studies should not be undertaken without adequate consideration of all of these issues. The Interstate Tagging Committee strongly encourages programs which are implemented with: 1) connection to an agency or scientific entity for study design and data analyses; 2) an established constituent base to promote the program; 3) training for individuals on proper fish handling and tagging techniques; and 4) identified research needs and objectives.

Any public or private entity proposing new tagging studies should seek guidelines from and provide a proposal to the Interstate Tagging Committee for review and coordination prior to initiation of any study. The proposal should use the ASMFC's Protocols for Tagging Programs as guidance in developing the proposed study. If the proposed study is an integral component of the FMP, study design should ideally be reviewed and approved by the Stock Assessment Subcommittee and/or Technical Committee as well, during the FMP review process. Tagging studies outside the ASMFC jurisdiction may choose not to participate in the ASMFC review process.

The ASMFC's Interstate Tagging Committee was developed to serve as a technical resource for jurisdictions other than the ASMFC, as well as for private, non-profit tagging groups, who may plan to tag. Protocols have been developed by the Committee as a source of information, advice and coordination for all Atlantic coast tagging programs. A copy of the protocol is available on the ASMFC web site. Copies of proposals for review and coordination should be provided to the Interstate Tagging Coordinator at the ASMFC.

3.5 ASSESSMENT OF STOCK CONDITION

An Atlantic striped bass stock assessment update or benchmark assessment will be performed by the Stock Assessment Subcommittee (SAS) on a regular schedule recommended by the Assessment Science Committee and as approved by the Interstate Fisheries Management Program Policy Board (ISFMP Policy Board). The Board can request a stock assessment at any time. The SAS and TC will meet to review the stock assessment and all other relevant data

sources. The stock assessment report shall follow the general outline as approved by the ISFMP Policy Board for all Commission-managed species. In addition to the general content of the report as specified in the outline, the stock assessment report may also address the specific topics detailed in the following sections. Specific topics in the stock assessment may change as the SAS continues to provide the best model and metrics possible to assess the Atlantic striped bass stock.

3.5.1 Assessment of Population Age/Size Structure

Estimates of Atlantic striped bass age and size structure are monitored based on results of the stock assessment. As of the 2018 benchmark assessment, the accepted model for use in striped bass stock assessments is a forward projecting statistical catch-at-age (SCA) model, which uses catch-at-age data and fishery-dependent and -independent survey indices to estimate annual population size and fishing mortality. Indices of abundance track relative changes in the population over time while catch data provide information on the scale of the population size. Age structure data (numbers of fish by age) provide additional information on recruitment (number of age-1 fish entering the population) and trends in mortality.

3.5.2 Assessment of Annual Recruitment

Recruitment (age-1) of Atlantic striped bass is estimated by the SCA stock assessment model. The SCA model uses several fishery-independent indices of relative abundance for young-of-year (YOY) and age-1 fish (New York and Maryland YOY and Yearling Surveys, and New Jersey and Virginia YOY Surveys).

3.5.3 Assessment of Spawning Stock Biomass

Spawning stock biomass is estimated by the SCA stock assessment model and those estimates are compared to target and threshold levels (i.e., biological reference points) in order to assess the status of the stock. The 1995 estimate of female SSB is used as the SSB threshold because many stock characteristics, such as an expanded age structure, were reached by this year, and this is also the year the stock was declared recovered. The female SSB target is equal to 125% of the female SSB threshold.

3.5.4 Assessment of Fishing Mortality

The fishing mortality rate is estimated by the SCA stock assessment model and that estimate is compared to target and threshold levels (i.e., biological reference points) in order to assess the status of the stock. The F threshold and target are calculated to achieve the respective SSB reference points in the long term.

3.6 STOCKING PROGRAM

Amendment 7 does not include a stocking program for Atlantic striped bass.

3.7 BYCATCH DATA COLLECTION PROGRAM

In general, states shall undertake every effort to reduce or eliminate the loss of striped bass from the general population due to bycatch discard mortality. The Technical Committee shall examine trends in estimated bycatch during benchmark stock assessments and stock assessment updates.

The overarching goal of the bycatch data collection program (established through Addendum I to Amendment 6) is to develop more accurate estimates of striped bass discards and discard mortality. Additional sector-specific goals are listed below.

Commercial Fisheries

- Implement at-sea observer coverage on commercial vessels that are targeting striped bass, as well as vessels that may encounter striped bass, to collect information on the number of fish being discarded from various commercial gears. Ideally, the sampling effort will be optimally allocated, both seasonally and spatially, among directed and non-directed fishing that has a strong likelihood of generating striped bass bycatch.
- Determine the discard mortality associated with all of the commercial gear types currently encountering striped bass.
- Document the level of bycatch in identified problem fisheries in annual state compliance reports.

Recreational Fisheries

- Determine proportional use of different gear types and fishing practices (e.g. fly fishing, live bait fishing, circle hooks, treble hooks, etc.).
- Determine the discard mortality associated with each gear type and fishing practice.
- Document the level of bycatch in identified problem fisheries in annual state compliance reports.

For-Hire Fisheries

- Determine proportional use of different gear types and fishing practices (e.g. fly fishing, live bait fishing, circle hooks, treble hooks, etc.).
- Determine the discard mortality associated with each gear type and fishing practice.
- Document the level of bycatch in identified problem fisheries in annual state compliance reports.

3.7.1 Requirements and Recommendations for Bycatch Data and Research

MANDATORY DATA COLLECTION

- Collect commercial fishery data elements consistent with ACCSP standards.
- Coordinate with NMFS to ensure coverage in federal waters.
- Continue collection of quantitative data on the bycatch of finfish species as reported by interviewed fishermen through existing recreational and for-hire intercept surveys (ACCSP standard).

RECOMMENDED DATA COLLECTION

- Implement commercial at-sea observer coverage on 2-5% of the total trips in state waters. Applicable to all states with commercial fisheries (directed and non-directed) that encounter striped bass.
- Develop "add-on" questions for interview surveys to collect information on gear/terminal tackle used (circle hooks, J-Hooks, treble hooks, fly fishing, live bait, etc.) in recreational and for-hire fisheries.
- Develop a survey to estimate size composition of discarded fish. The Board will need to work with the TC to determine an effective way to collect these data. Approaches for consideration include, but are not limited to, volunteer angler surveys, additional questions for intercept survey, and expansion of data collected in for-hire fisheries.

MANDATORY DISCARD MORTALITY STUDIES

- Review existing commercial discard studies to determine what information has already been collected.
- Review existing recreational studies for various species and gears to develop estimates of striped bass discard mortality.

RECOMMENDED DISCARD MORTALITY STUDIES

- Conduct studies to estimate the discard mortality associated with the following commercial gear types: trawl (highest priority), gill net, fixed nets (pound net/fyke net/floating fish trap), hook and line, haul seine. These studies do not need to be conducted in all states, but should be conducted to reflect the fishing activities (gear type, temperature, salinity, etc.) that encounter striped bass.
- Conduct additional studies on recreational post-release mortality associated with a range of temperature, salinity, and gear types.

MANDATORY TECHNICAL COMMITTEE ANALYSES

- Analyze any newly collected commercial at-sea observer data to determine if any discarding "hot spots" can be reliably identified.
- Develop estimates for the proportion of discards based on water temperature and salinity, if possible. Apply existing post-release mortality rates to the proportions to determine the effect on estimated discard mortality. For example, if 20% of the catch occurs in warm brackish water, that portion of the catch is likely to have a higher mortality rate than discards in cold ocean water.

RECOMMENDED TECHNICAL COMMITTEE ANALYSES

- Analyze the number and type of all fishing trips from each state, by season and area if possible, and determine ideal allocation of recommended observer coverage.

MANDATORY DATA REPORTING

- Once any mandatory or recommended elements of this program are implemented, states are required to report any bycatch and/or data monitoring as part of the annual compliance report to the Commission.

4.0 MANAGEMENT PROGRAM AND PROPOSED OPTIONS

This section includes the following sections with options for Board consideration and public comment: *Section 4.1 Management Triggers; Section 4.2.2 Measures to Address Recreational Release Mortality; Section 4.4 Rebuilding Plan;* and *Section 4.6.2 Management Program Equivalency.*

The striped bass ocean fishery (also referred to as "ocean region") is defined as all fisheries operating in coastal and estuarine areas of the U.S. Atlantic coast from Maine through North Carolina, excluding the Chesapeake Bay and Albemarle Sound-Roanoke River management areas. The Chesapeake Bay fishery is defined as all fisheries operating within Chesapeake Bay, except for the Chesapeake Bay spring trophy fishery. The Chesapeake Bay spring trophy fishery is part of the ocean fishery for management purposes because it targets coastal migratory striped bass.[10]

The Albemarle Sound-Roanoke River stock is managed separately by the State of North Carolina (see *Section 2.5.2*).

Draft Amendment 7 continues to use bag and size limits, as well as a circle hook requirement when fishing with bait, to manage recreational striped bass fisheries, and quotas and size limits to regulate the striped bass commercial fisheries. Draft Amendment 7 also considers options for effort controls (seasonal closures), additional gear restrictions, and outreach efforts to manage the recreational fishery and address recreational release mortality.

4.1 MANAGEMENT TRIGGERS

The management triggers are intended to keep the Board accountable and were developed at a time when the stock was thought to be at historic high abundance and well above the SSB target. However, as perceptions of stock status and fishery performance have changed, shortfalls with how the management triggers are designed have emerged. When female SSB is below the target level, the variable nature of fishing mortality can result in a continued need for management action. Additionally, the shorter timetables for corrective action are in conflict with the desire for management stability, and the use of point estimates does not account for an inherent level of uncertainty. Furthermore, the Board is sometimes criticized for considering changes to the management program before the stock has a chance to respond to the most recent set of management changes. Lastly, the observed long period of below average recruitment which contributed to recent declines in biomass has raised questions about the recruitment-based trigger and whether it is designed appropriately.

[10] While the Chesapeake Bay spring trophy fishery is subject to the same requirements as the ocean recreational fishery, Chesapeake Bay trophy fishery removals are counted as part of total removals from the Chesapeake Bay and are included as part of the Chesapeake Bay fleet in the stock assessment model.

The following options consider how to set the management triggers in Amendment 7. Upon reaching any (or all) of the specified management triggers, the Board is required to alter the management program to ensure the objectives of Amendment 7 are achieved. It is important to note that the Board is not limited to taking action only when a management trigger is tripped.

The Status Quo option is defined by the management triggers as specified in Amendment 6 to the Atlantic Striped Bass FMP (listed below). To account for the various combinations of management trigger methods, timeframes, implementation deadlines, and deferment options, the following management alternatives have been divided into four (4) tiers. The first tier outlines the F-based trigger methods, the second tier outlines the SSB-based trigger methods, the third tier outlines the recruitment trigger methods, and the fourth tier outlines deferred management options if a management trigger is tripped and certain criteria are met. Within each tier is a set of primary options and sub-options (alternatives) for the Board to choose from.

An alternative under each primary option within a tier must be chosen to complete each management trigger package. For example, to achieve the current management triggers specified in Amendment 6 (status quo), the Board would select: Tier 1, Sub-options A1, B1, and C1; Tier 2, Sub-options A1, B1, and C1; Tier 3, Sub-options A1 and B1; and Tier 4, Option A. This decision framework is designed to provide the Board the option to maintain, remove, or change any of the existing management triggers individually. The intent is to evaluate the triggers against the most recent year(s) of data from the most recent stock assessment update or benchmark stock assessment accepted by the Board for management use. During years when stock assessments are conducted, the recruitment trigger should be evaluated concurrently, when possible, with the F and female SSB triggers when assessment results are presented to the Board.

Amendment 6 Management Triggers (Status Quo):

1) If the fishing mortality threshold is exceeded in any year, the striped bass management program must be adjusted to reduce the fishing mortality to a level that is at or below the target within one year.
2) If female SSB falls below the threshold, the striped bass management program must be adjusted to rebuild the biomass to the target level within an established timeframe [not to exceed 10-years].
3) If the fishing mortality target is exceeded in two consecutive years and the female SSB falls below the target within either of those years, the striped bass management program must be adjusted to reduce the F to a level that is at or below the target within one year.
4) If female SSB falls below the target for two consecutive years and the fishing mortality rate exceeds the target in either of those years, the striped bass management program must be adjusted to rebuild the biomass to a level that is at or above the target within an established timeframe [not to exceed 10-years].
5) If any Juvenile Abundance Index shows recruitment failure (i.e., an index value lower than 75% of all other values in the dataset) for three consecutive years, then the Board

will review the cause of recruitment failure (e.g., fishing mortality, environmental conditions, and disease) and determine the appropriate management action.

TIER 1 OPTIONS: Fishing Mortality (F) Management Triggers

Option A: Timeline to Reduce F to the Target

Sub-option A1 (status quo): Reduce F to a level that is at or below the target within one year.

Sub-option A2: Reduce F to a level that is at or below the target within two years.

Option B: F Threshold Triggers

Sub-option B1 (status quo): If F exceeds the F threshold, the striped bass management program must be adjusted to reduce F to a level that is at or below the target within the timeframe selected under Option A.

Sub-option B2: If the two-year average F exceeds the F threshold, the striped bass management program must be adjusted to reduce F to a level that is at or below the target within the timeframe selected under Option A. The two-year average F should not include data under different management actions (i.e., the F threshold trigger should not be evaluated unless there are at least two years of data in the assessment under the most recent management action).

Note: Although the trigger would only be evaluated when sufficient data years are available for sub-options B2, the Board is not limited to taking action only when a management trigger is tripped.

Option C: F Target Triggers

Sub-option C1 (status quo): If F exceeds the F target for two consecutive years and female SSB falls below the SSB target in either of those years, the striped bass management program must be adjusted to reduce F to a level that is at or below the target within the timeframe selected under sub-option A.

Sub-option C2: If F exceeds the F target for three consecutive years, the striped bass management program must be adjusted to reduce F to a level that is at or below the target within the timeframe selected under sub-option A.

Sub-option C3: No management trigger related to F target.

TIER 2 OPTIONS: Female Spawning Stock Biomass (SSB) Management Triggers

Option A: Deadline to Implement a Rebuilding Plan

Sub-option A1 (status quo): No Deadline to Implement a Rebuilding Plan
There would not be any requirement regarding how quickly the Board must implement a rebuilding plan when an SSB-based management trigger is tripped, as long as the rebuilding timeframe does not exceed 10-years from when the management trigger was tripped (i.e., the Board may implement a rebuilding plan at any time in response to the management trigger). A management trigger is not considered tripped until the Board formally reviews and accepts, if necessary, the results of the relevant stock assessment.

Sub-option A2: Two-Year Deadline to Implement a Rebuilding Plan
The Board must implement a rebuilding plan within two years from when an SSB-based management trigger is tripped. A management trigger is not considered tripped until the Board formally reviews and accepts, if necessary, the results of the relevant stock assessment.

Option B: SSB Threshold Trigger

Sub-option B1 (status quo): If female SSB falls below the SSB threshold, the striped bass management program must be adjusted to rebuild the biomass to the target level within an established timeframe [not to exceed 10-years].

Sub-option B2: No management trigger related to the female SSB threshold. The Board cannot choose this option in combination with Sub-option C3 below (i.e., there must be an SSB-based management trigger). This option recognizes that if managing to the SSB target is more conservative than managing to the SSB threshold, and if the management response is the same (i.e., rebuild to the SSB target within 10 years) for both types of SSB triggers, then there does not necessarily have to be a trigger for both.

Option C: SSB Target Trigger

Sub-option C1 (status quo): If female SSB falls below the target for two consecutive years and the fishing mortality rate exceeds the target in either of those years, the striped bass management program must be adjusted to rebuild the biomass to a level that is at or above the target within an established timeframe [not to exceed 10-years].

Sub-option C2: If female SSB falls below the target for three consecutive years, the striped bass management program must be adjusted to rebuild the biomass to a level that is at or above the target within an established timeframe [not to exceed 10-years].

Sub-option C3: No management trigger related to the female SSB target. The Board cannot choose this option in combination with Sub-option B2 above (i.e., there must be an SSB-based management trigger).

TIER 3 OPTIONS: Recruitment Triggers

Option A: Recruitment Trigger Definition

The status quo recruitment trigger (sub-option A1) was designed and has performed adequately to identify true recruitment failure (i.e., a prolonged period of very low recruitment events as seen during the 1970s and 1980s). Sub-options A2 and A3 are designed to identify periods of recruitment that are not necessarily at historically low levels, but are lower than the period of high recruitment seen in the late 1990s and early 2000s. As requested by the Board, the recruitment trigger alternatives are more sensitive than the status quo in order to alert the Board to periods of low recruitment. Specifically, the alternative trigger options are designed to be an early warning sign of potential reduced productivity of the stock following multiple weak year classes entering the population.

The status quo recruitment trigger includes the years of very low recruitment in the 1970s and 1980s in the trigger reference period. Sub-options A2 and A3 would change the reference period to exclude those years of very low recruitment which results in a more sensitive trigger. Sub-options A2 and A3 use a reference period of 1992-2006, which was identified as a period of high recruitment (i.e., high recruitment regime) by a change point analysis on the Maryland juvenile abundance index (JAI). This period spans the time of high recruitment seen in the late 1990s through the early 2000s. The Maryland JAI was used as the basis for this analysis because it is closely correlated to the coastwide age-1 estimates from the stock assessment model, and provides the longest time series to evaluate changes in high and low periods over time. If sub-option A2 or A3 is selected, the TC will update the change point analysis during benchmark stock assessments to evaluate if the high recruitment period for the trigger has changed with new years of data.

> **Sub-option A1 (status quo):** The recruitment trigger is tripped when any of the JAIs (ME, NY, NJ, MD, VA, NC) show recruitment failure, which is defined as a value that is below 75% of all values (i.e., below the 25th percentile) in a fixed time series appropriate to each juvenile abundance index, for three consecutive years. This status quo trigger tripped one time (NC in 2020) since approval of Amendment 6 in 2003 (Table 2). The state JAIs and reference periods are as follows:

State JAI	Water Body	Reference Period*
ME	Kennebec River	1987-2009
NY	Hudson River	1985-2009
NJ	Delaware River	1986-2009
MD	Chesapeake Bay	1957-2009
VA	Chesapeake Bay	1980-2009
NC	Albemarle-Roanoke	1955-2009

*Reference period established through Addendum II (2010).

For the following sub-options, the Board could select sub-option A2 (moderate sensitivity trigger) or A3 (high sensitivity trigger). Sub-options A2 and A3 would alert the Board to periods of low recruitment (i.e., while the stock has not quite reached recruitment failure, there have been multiple years of low recruitment).

Sub-option A2: The recruitment trigger is tripped when any of the four JAIs used in the stock assessment model to estimate recruitment (NY, NJ, MD, VA)[11] shows an index value that is below 75% of all values (i.e., below the 25th percentile) in the respective JAI from 1992-2006, which represents a period of high recruitment, for three consecutive years. The high recruitment reference period used for this trigger may be adjusted as recommended by the TC during benchmark stock assessments. This trigger alternative has a moderate sensitivity; it is more sensitive than the status quo but less sensitive than sub-option A3 (Figure 1). This trigger alternative would have tripped three times since 2003: NY in 2006; MD in 2010; MD in 2014 (Table 2).

Sub-option A3: The recruitment trigger is tripped when any of the four JAIs used in the stock assessment model (NY, NJ, MD, VA) shows an index value that is below the median of all values in the respective JAI from 1992-2006, which represents a period of high recruitment, for three consecutive years. The high recruitment reference period used for this trigger may be adjusted as recommended by the TC during benchmark stock assessments. This trigger alternative has a higher sensitivity than both the status quo trigger and sub-option A2 (Figure 1). This trigger alternative would have tripped six times since 2003: NY in 2006; MD in 2008; MD in 2009; MD and VA in 2010; NY in 2013; MD in 2014 (Table 2).

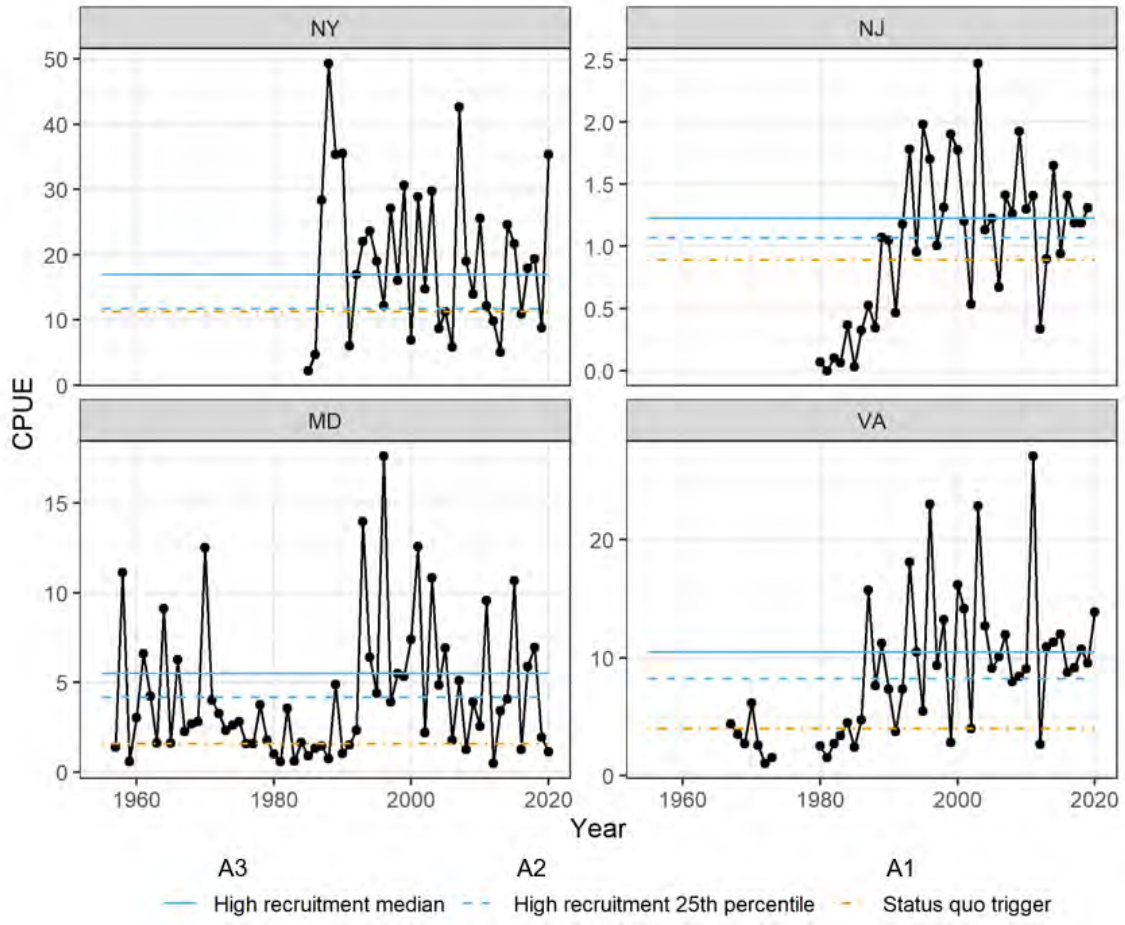
[11] The North Carolina JAI for the Albemarle Sound-Roanoke River is not used in the stock assessment because the Albemarle Sound-Roanoke River stock is managed and assessed separately by the state of North Carolina; the Maine JAI for the Kennebec River is not used in the stock assessment because that stock is assumed to only contribute a small amount to the coastwide stock.

Table 2. When the status quo and alternative juvenile abundance index (JAI) triggers would have tripped (black shaded cells) compared to the model estimates of recruitment. Note: "Core" JAIs are the four JAIs used in the stock assessment model to estimate recruitment (NY, NJ, MD, VA).

	Recruitment (Model age 1 estimates lagged back 1 year)	Sub-option A1 Status Quo Ref. period = Established through Addendum II One or more JAI below 25th Percentile for 3 consecutive years	Sub-option A2 Ref. period = High recruitment (1992-2006) One or more of the "core" JAIs below 25th Percentile for 3 consecutive years	Sub-option A3 Ref. period = High recruitment (1992-2006) One or more of the "core" JAIs below Median for 3 consecutive years
2003				
2004				
2005				
2006				
2007				
2008				
2009				
2010				
2011				
2012				
2013				
2014				
2015				
2016				
2017				
2018				
2019				
2020				
	# Years tripped	**1**	**3**	**6**

Below average recruitment
Above average recruitment
No data available
Trigger not tripped
Trigger tripped

Figure 1. Juvenile abundance indices (JAI) for NY, NJ, MD, and VA showing the trigger reference level for each recruitment trigger alternative. For each sub-option, the trigger would be tripped if any of the four JAIs falls below the specified reference level for three consecutive years.



Option B: Management Response to Recruitment Trigger

The following sub-options are alternatives for the management response that would be triggered when the recruitment trigger definition selected under Option A is tripped. Sub-options B2 and B3 are intended to reduce fishing pressure as the weak year classes enter the population. These management response options are not necessarily designed to increase recruitment in the future because the striped bass stock exhibits a weak stock-recruit relationship (i.e., a larger spawning stock does not necessarily correlate with higher recruitment).

Juvenile abundance indices and model recruitment estimates provide information on the near-term productivity of the stock. Several years of poor recruitment may indicate the stock is entering a low recruitment regime, and levels of removals that were sustainable during average or above average recruitment regimes may not be sustainable in the future. If the Board wants to be proactive about responding to periods of lower recruitment, the Board could redefine the F target to be more precautionary (sub-options B2 and B3).

The F target for striped bass is defined as the level of F that will maintain the population at the SSB target in the long-term. F target is calculated by drawing recruitment from the values observed from 1990 to 2017 (this time period includes both high and low recruitment values, but does not include the very low values in the 1980s). If recruitment is only drawn from a below-average period instead of the full 1990-2017 period, for example, the F target would be lower. If the population is fished at the current F target but average recruitment remains lower than the 1990-2017 mean, then the population may not rebuild to the SSB target in the long term.

Based on the change point analysis of the Maryland JAI with data through 2020, the TC identified 1992-2006 to represent the high recruitment period (i.e., high recruitment regime) and 2007-2020 to represent the low recruitment period (i.e., low recruitment regime). This translates to years 1993-2007 and 2008-2017 for age-1 model estimates of recruit abundance used to calculate the interim F target for sub-options B2 and B3. If sub-option B2 or B3 is selected, the TC will update the change point analysis during benchmark assessments to evaluate whether the definition of the high/low recruitment periods for the trigger has changed with new years of data.

OPTIONS

Sub-option B1 (status quo): If the recruitment trigger is tripped, the Board would review the cause of recruitment failure (e.g., fishing mortality, environmental conditions, and disease) and determine the appropriate management action.

For the following sub-options, the Board could select sub-option B2 or B3. Note: Sub-option B2 evaluates one point estimate of F against the F target, which is more conservative than the F-based management trigger definitions under Section 4.1 used in sub-option B3.

Sub-option B2. If the recruitment trigger is tripped, an interim F target calculated using the low recruitment assumption is implemented, and if F from the terminal year of the most recent stock assessment is above the interim F target, the striped bass management program must be adjusted to reduce F to the interim F target within one year.

Sub-option B3. If the recruitment trigger is tripped, an interim F target and interim F threshold calculated using the low recruitment assumption are implemented, and the F-based management triggers defined in *Section 4.1* would be reevaluated using those interim reference points. If an F-based trigger is tripped upon reevaluation, the striped bass management program must be adjusted to reduce F to the interim F target within the timeline defined in *Section 4.1*.

Note: Under both Sub-option B2 and B3, the lower interim F target would remain in place at least until the next stock assessment update or benchmark assessment is approved for management use. The Board would determine at that time which F rate

(target or interim target) to manage towards moving forward by considering factors such as current stock status, recent JAI data, and TC input.

TIER 4 OPTIONS: Deferred Management Action

Under Amendment 6, if a management trigger is tripped at any time, the Board must take the corresponding action. However, the following options provide the Board flexibility to defer management action when a management trigger is tripped and certain criteria are met. The Board may choose more than one option, unless it chooses Option A (status quo): No Deferred Management Action. Options C, D and E are invalid if the Board chooses Tier 1, Sub-option C3 (no F target management trigger).

These options were developed in response to the Board's concern about the frequent need for management action due to triggers tripping with each stock assessment update or benchmark. Stock assessment updates are typically conducted about every 2 years with benchmark assessments conducted about every 5 years. The alternative Options B-F would defer management action until the following stock assessment. The Board can request an additional stock assessment or request a change to the stock assessment schedule at any time.

Option A (status quo): No Deferred Management Action.

If any (or all) of the management triggers are tripped following a benchmark stock assessment or assessment update, the Board is required to respond to that trigger regardless of when the last management action was implemented in response to any management trigger.

Option B: Management action may be deferred until the next assessment if it has been less than three years since the last management action was implemented in response to a management trigger.

If any (or all) of the management triggers are tripped following a benchmark stock assessment or assessment update, and it has been less than three years since the last management action was implemented (i.e., the assessment incorporates less than three years of data under the new fishery regulations) in response to a management trigger, the Board may defer the management response until the management triggers are reevaluated after the next stock assessment.

Option C: Management action may be deferred until the next assessment if the F target management trigger is tripped and SSB is above the target.

If the F target management trigger is tripped but SSB is at or above the SSB target, the Board may defer the management response until the management triggers are reevaluated after the next stock assessment.

Option D: Management action may be deferred until the next assessment if the F target management trigger is tripped and SSB is projected to increase or remain at the current level over the next five years.

If the F target management trigger is tripped, and if none of the SSB management triggers are tripped and projections indicate SSB will increase or remain at the current level over the next five years, the Board may defer the management response until the management triggers are reevaluated after the next stock assessment.

Option E: Management action may be deferred until the next assessment if the F target management trigger is tripped and there is at least a 75% probability of SSB remaining above the SSB threshold over the next five years.

If the F target management trigger is tripped, and if none of the SSB management triggers are tripped and projections indicate SSB has at least a 75% probability of remaining above the SSB threshold over the next five years, the Board may defer the management response until the management triggers are reevaluated after the next stock assessment.

Option F: If a management trigger trips after the Board has already initiated action in response to a different management trigger, the Board can defer management action in response to the subsequent trigger until the next assessment.

For example, this scenario would most likely occur if the Board selects a new recruitment trigger that would require reducing F in response. The recruitment trigger could trip and the Board could initiate action in response; however, a few months later an F or SSB trigger could trip based on results of a stock assessment. Under this option, the Board could defer responding to the F or SSB trigger until the next assessment because the Board is already taking action in response to the recruitment trigger.

Figure 2a. Summary of management trigger options Tiers 1-2: fishing mortality (F) and female spawning stock biomass (SSB) triggers.

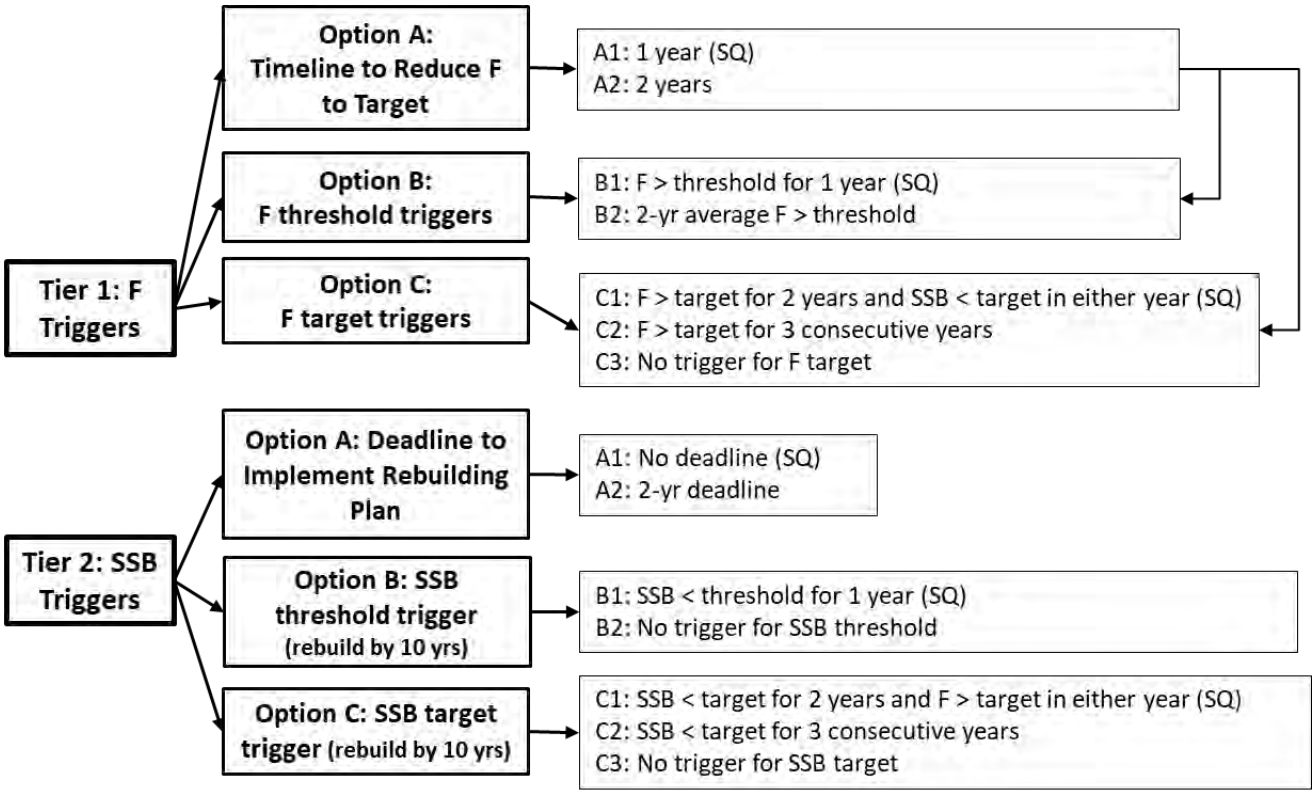


Figure 2b. Summary of management trigger options Tier 3: recruitment-based trigger.

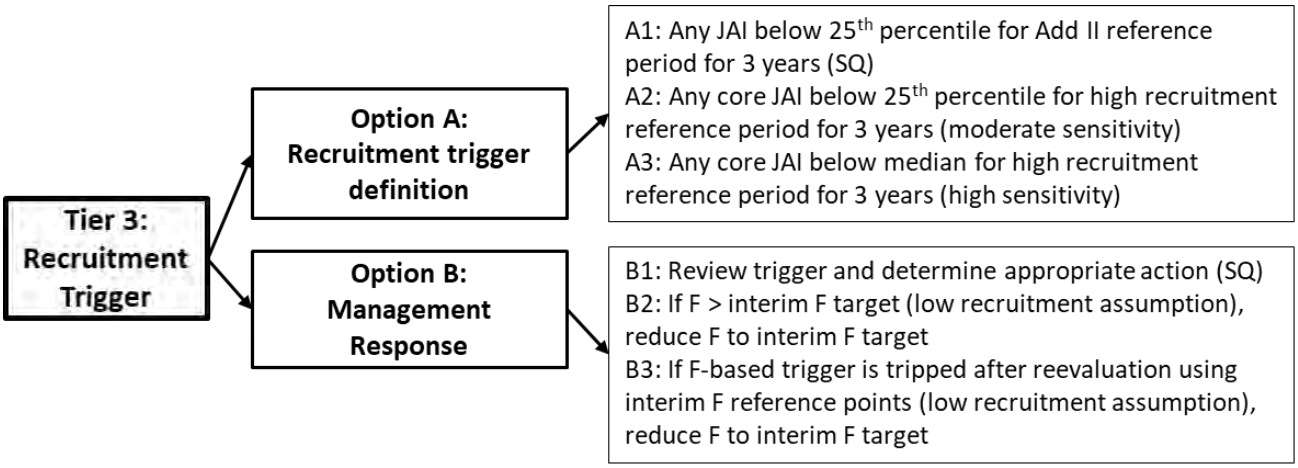
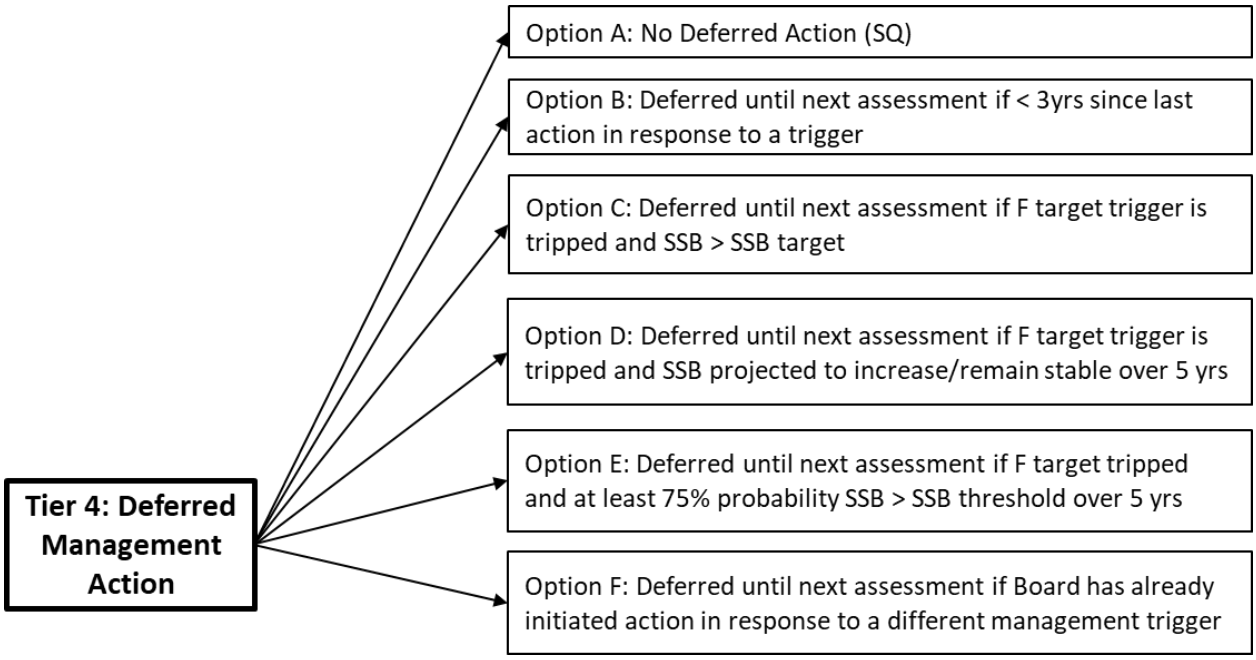


Figure 2c. Summary of management trigger options Tier 4: deferred management action.



4.2 RECREATIONAL FISHERY MANAGEMENT MEASURES

4.2.1 Size Limits, Bag Limit, and Seasons

Ocean recreational fisheries are constrained by a one fish bag limit and a slot limit of 28 inches to less than 35 inches. Chesapeake Bay recreational fisheries are constrained by a one fish bag limit and a minimum size of 18 inches. All bag limits are per person per day. All minimum and maximum size limits are in total length. States are required to maintain the same seasons that were in place in 2017.[12]

4.2.2 Measures to Address Recreational Release Mortality

Recreational releases are fish caught and released alive during recreational fishing trips. A proportion of releases die as a result of that fishing interaction, which is referred to as release mortality (or dead releases). The number of striped bass that die after being caught and released is estimated by multiplying the total number of live releases by an estimated rate of

[12] Some states have implemented alternative recreational size limits, bag limits, and seasons through conservation equivalency, which are maintained through current (approved in 2020) CE programs and state implementation plans from Addendum VI to Amendment 6. See Table 10 in *Section 9.0* for each state's 2020 recreational measures. Maryland's updated summer no-targeting closure dates (changed from August 16-31 closure in 2020 to July 16-31 closure in 2021) was discussed at the August 2021 Board meeting.

hooking mortality. The stock assessment currently applies a 9% hooking mortality rate to all recreationally released striped bass. This does not mean that every time a fish is released alive it has a 9% chance of dying. Under some conditions, the released fish has a higher or lower probability of dying, but overall, coastwide, it is assumed that 9% of all striped bass released alive die.

This 9% hooking mortality rate estimate is from a study by Diodati and Richards (1996) which took place in a saltwater environment and encompassed a range of variables including hook types, hooking locations, and angler experience levels. The TC conducted a meta-analysis of other striped bass release mortality studies which confirmed that an overall 9% release mortality rate accounts for the variation in conditions and factors that attribute to release mortality coastwide.

Since 1990, roughly 90% of all striped bass caught recreationally were released alive either due to cultural preferences (i.e., fishing with the intent to catch and release striped bass) or regulation (e.g., the fish is not of legal size, was caught out of season, or the angler already caught the bag limit) (Figure 12). Each year since 2017, more fish were estimated to have died from catch and release fishing than were harvested by the recreational fishery. For example, 2.76 million fish are estimated to have died from catch and release fishing in 2020, whereas 1.71 million fish were harvested in 2020 (Table 11). Since release mortality accounts for a significant proportion of total fishing mortality, Addendum VI sought to lower the rate at which fish die after being released by requiring the use of non-offset circle hooks when fishing for striped bass with bait because circle hooks have been proven to help reduce rates of gut-hooking when fished correctly. In addition to hook type, studies have shown other factors influence release mortality as well, including environmental conditions (e.g., salinity, air and water temperatures), angler experience, and angler behavior (e.g., how fish are handled). Addendum VI also encouraged states to develop education campaigns to increase compliance with circle hook regulations and to encourage responsible angler behavior.

If management action is taken to influence where mortality (harvest vs. discard) is coming from, managers must consider the impacts those actions will have on the fishery. For example, management measures focusing on reducing recreational releases could discourage participation from anglers that value food fish and negatively impact industries that cater to those anglers.

The current management program primarily uses bag limits and size limits to control harvest, and is not designed to control the catch and release fishery which makes it difficult to control overall fishing mortality. Some stakeholders value the ability to harvest striped bass, either commercially or recreationally, while others value the experience of fishing for striped bass regardless of whether they are able to retain fish. The acceptable proportion of release mortality in total removals should reflect the management objectives for the fishery. Nonetheless, in order to better control all sources of fishing mortality, managers could consider additional gear restrictions to help increase the chance of survival after being released, or

additional effort controls (i.e., time and area closures) to reduce the number of trips interacting with striped bass and thus the overall number of striped bass released alive.

In addition to the circle hook requirement implemented through Addendum VI (Option A. Status Quo), the Board could consider the following types of options to address recreational release mortality:

- Option B. Effort Controls (Seasonal Closures)
- Option C. Gear Restrictions
- Option D. Outreach and Education

Although the impact of many of these options on the stock are difficult to quantify, they are intended to reduce the number of recreational releases or improve post-release survival. The Board could select one or more sub-options from one or more primary option categories that would be implemented in addition to the status quo circle hook measures.

Option A. Status Quo (Addendum VI circle hook measures)
Under this option, the circle hook requirement implemented through Addendum VI to Amendment 6 (Addendum VI Section 3.2) would remain in place <u>as the only measure implemented</u> specifically to address recreational release mortality:

> *The use of circle hooks, as defined herein, is required when recreationally fishing for striped bass with bait, which is defined as any marine or aquatic organism live or dead, whole or parts thereof. This shall not apply to any artificial lure with bait attached. A circle hook is "a non-offset hook where the point is pointed perpendicularly back towards the shank". The term "non-offset" means the point and barb are in the same plane as the shank (e.g. when the hook is laying on a flat surface, the entire hook and barb also lay flat). States have the flexibility to further specify details of the regulation to address specific needs of the state fishery. In order to promote the use of circle hooks, states are encouraged to develop public education and outreach campaigns on the benefits of circle hooks when fishing with bait. The intent of the requirement is to reduce striped bass discard mortality in the recreational fishery. It is recommended that striped bass caught on any unapproved method of take must be returned to the water immediately without unnecessary injury…*
>
> *The use of circle hooks by anglers targeting striped bass with bait, live or chunk, has been identified as a method to reduce the discard mortality of striped bass in recreational fisheries. When a circle hook begins to exit the mouth of a fish, the shape causes the shaft to rotate towards the point of resistance and the barb is more likely to embed in the jaw or corner of the fish's mouth. Circle hooks can reduce rates of "gut-hooking" and lower the likelihood of puncturing internal organs if the hook is swallowed…*

For the following Options B – D, any sub-options selected would be implemented in addition to the current circle hook requirements described above in Option A (status quo).

Option B. Effort Controls (Seasonal Closures)

Recreational release mortality could be addressed by reducing fishing effort in the recreational fishery through implementation of seasonal closures, which are intended to reduce the number of live releases by reducing the number of fishing trips (effort) interacting with striped bass. The following options outline a variety of seasonal closures for consideration.[13] Some of the closure options would offer additional benefits to the stock by reducing effort during seasons associated with higher post-release mortality rates or by protecting spawning or pre-spawn fish, which could contribute to stock rebuilding. When considering effort controls, the Board must weigh the cost of limiting access to the fishery with the potential benefit of decreasing recreational release mortality. Current recreational seasons are summarized in Figures 3 and 4.

Seasonal closures could be no-harvest closures (i.e., catch and release fishing is allowed) or no-targeting closures (i.e. no person may take, attempt to take, target, or have in possession any striped bass). The most appropriate approach may depend on the reason for the closure; for example, implementing a no-targeting closure during high temperature periods when release mortality rates are higher. The majority of the proposed options are no-targeting closures in order to address recreational releases resulting from both harvest trips and catch-and-release fishing trips. Although there are added enforceability concerns and uncertainty about angler compliance with no-targeting closures, the PDT assumes maximum reduction of effort, and thus a reduction in number of releases would be achieved with a no-targeting closure. While no-harvest closures would reduce the number of fish harvested, angler behavior may shift to catch-and-release fishing, thereby increasing the number of recreational releases which is counter to the objective of reducing release mortality.

It is important to note that fishing trips targeting other species that incidentally catch and release striped bass would still occur regardless of closure type. For example, an average of 24% of all trips interacting with striped bass in 2018 and 2019 were non-targeted trips or trips where striped bass was the secondary target species. These trips would likely still occur during a striped bass no-targeting closure. Additionally, seasonal closures for striped bass may shift effort to targeting other species or to other times of year when the striped bass fishery is open.

A coastwide closure would ensure consistency in the timing of closures across all states, but would present an equitability challenge. Recreational fisheries operate very differently along the coast based on timing (availability of fish), among other biological, environmental, and socioeconomic considerations, so coastwide closures would result in different levels of effort

[13] In the criteria for CE proposals for Addendum VI, the TC noted season closures less than two weeks duration are unlikely to be effective. For that reason, the following options do not include any closures less than two weeks duration.

reduction across states. State-specific or regional closure options could help account for these differences, but this may result in a patchwork of season closures across the coast. States would need to develop closure proposals to pursue through their state public processes and submit for TC review and Board approval as part of state implementation plans.

Note on Estimating Reduction in Removals: No-targeting closures considered for Draft Amendment 7 are not intended to achieve a specific reduction in removals. Estimating the reduction in removals from a no-targeting seasonal closure depends on assumptions about changes in angler behavior, which is highly uncertain. The TC has not established a standardized method for estimating the reduction in removals from a no-targeting closure.[14] Given the no-targeting closure options considered in Draft Amendment 7 (i.e., potential inclusion of no-targeting closures in the striped bass management program) as well as the potential for states to propose no-targeting closures in future CE proposals, the PDT recommends the Board task the TC to establish such methods in advance of implementation of subsequent management actions. The TC may need guidance from the Board on this task.

If sub-option B1 (state-specific closures) is selected, the Board must also consider options under Tier 1 to determine applicability of existing no-targeting closures. Sub-option B2 (spawning closures) can be selected independent of or in addition to sub-option B1.

> **Sub-option B1. State-Specific Two-Week Closures:** All recreational targeting of striped bass would be prohibited for a minimum two-week period to reduce fishing effort during times when the striped bass fishery is particularly active in each state. As defined in sub-options B1-a and B1-b, a minimum threshold of directed trips targeting striped bass will be used to define "active" waves for each state in which to implement its closure. In addition to this criteria, state implementation plans should consider protection for spawning and pre-spawn fish, extreme air and water temperatures, and relevant water quality data (dissolved oxygen, salinity, etc.), as well as socioeconomic considerations and regulatory consistency within shared waterbodies. If this options is selected, CE would not be permitted.
>
> > **B1-a. Minimum 15% Directed Trips:** Each state's closure must occur during a Wave with at least 15% of the state's annual striped bass directed trips, as provided in Table 3. At least two waves in each state/region meets this 15% minimum threshold. Considering the limited availability of MRIP data for Pennsylvania, Potomac River Fisheries Commission, and District of Columbia, those three jurisdictions would determine which state listed in Table 3 most closely aligns with their distribution of effort.

[14] In their review of Addendum VI CE proposals, the TC noted "the TC supports the use of closed seasons to reduce effort and dead discards, but stresses that the predicted savings, particularly from a "no targeting" provision, are highly uncertain due to current data limitations and predicting changes in angler behavior."

B1-b. Minimum 25% Directed Trips: Each state's closure must occur during a Wave with at least 25% of the state's annual striped bass directed trips, as provided in Table 3. At least one wave in each state/region meets this 25% minimum threshold. Considering the limited availability of MRIP data for Pennsylvania, Potomac River Fisheries Commission, and District of Columbia, those three jurisdictions would determine which state listed in Table 3 most closely aligns with their distribution of effort.

Table 3. Proportion of each state's total annual striped bass directed trips (primary and secondary target) by wave for 2017-2019. Note: the distribution of directed trips reflects closures that were already in place in 2017-2019 and so may not fully reflect when fish are available. Source: MRIP

	Jan-Feb Wave 1* Percent	Mar-Apr Wave 2* Percent	May-Jun Wave 3 Percent	Jul-Aug Wave 4 Percent	Sep-Oct Wave 5 Percent	Nov-Dec Wave 6* Percent
MAINE	0.0%	0.0%	34.7%	41.6%	23.7%	0.0%
NEW HAMPSHIRE	0.0%	0.0%	25.6%	53.7%	20.8%	0.0%
MASSACHUSETTS	0.0%	2.3%	33.7%	34.5%	23.8%	5.7%
RHODE ISLAND	0.0%	12.9%	30.3%	20.6%	19.2%	17.1%
CONNECTICUT	0.0%	22.9%	29.9%	18.7%	13.2%	15.3%
NEW YORK	0.0%	21.3%	26.3%	13.5%	20.3%	18.6%
NEW JERSEY	0.0%	24.7%	18.4%	4.1%	11.7%	41.1%
DELAWARE	0.0%	30.9%	15.3%	8.1%	7.8%	38.0%
MD CHES BAY	0.0%	14.6%	21.1%	26.7%	17.7%	19.9%
VA CHES BAY	0.0%	7.7%	5.5%	1.6%	15.0%	70.1%
MD OCEAN	0.0%	0.6%	20.7%	0.4%	40.7%	37.6%
VA OCEAN	0.0%	1.3%	24.1%	31.4%	0.0%	43.2%
NC OCEAN	5.1%	9.0%	12.2%	17.8%	1.7%	54.3%

*The Fishing Effort Survey is not administered in any state except NC during Wave 1, nor in ME during Waves 2 and 6.

***Tier 1. Applicability of Existing No-Targeting Closures*:** If sub-option B1 is selected, the Board needs to consider whether the summer no-targeting closures implemented in 2020 by Maryland and PRFC through CE to meet the required Addendum VI reduction would also meet the new seasonal closure requirement.

Option A. Existing no-targeting closures implemented in 2020 would fulfill the requirements of sub-option B1.

Option B. Existing no-targeting closures implemented in 2020 would not fulfill the requirements of sub-option B1. States that implemented no-targeting closures in 2020 would need to choose between the following actions:

- Implement an additional closure to meet the new seasonal closure requirement as selected in sub-option B1; OR
- Implement only the new seasonal closure requirement as selected in sub-option B1, and implement the FMP standard size limit for the Chesapeake Bay recreational fishery *(Section 4.2.1)*.

Sub-option B2. Spawning Area Closures: The Board can select either or both of the following sub-options B2-a and B2-b. Multiple states currently have spawning closures in place with closure boundaries defined by those states. Existing spawning closures would be applied toward meeting the requirements of the selected option(s).[15] Spawning area closures during the spawning season could contribute to stock rebuilding by eliminating harvest and/or reducing releases of spawning and pre-spawn fish. Reducing releases during this time is particularly important to reduce stress and injury to fish as they move into lower salinity spawning areas. If new information on the timing of striped bass spawning is available in the future, the TC would conduct a review of that research and recommend changes to the timing of spawning closures if needed. If this option is selected, CE would not be permitted.

Prior to implementation, if sub-option B2-a and/or sub-option B2-b is selected, all existing spawning closure boundaries and new proposed spawning closure boundaries must be reviewed by the TC and included as part of state implementation plans.

B2-a. No-Harvest Spawning Closure Required: All recreational harvest of striped bass would be prohibited during Waves 1 and 2 (January through April) in the following spawning areas to protect pre-spawn and spawning fish: Chesapeake Bay, Delaware River/Bay, Hudson River, and Kennebec River. States bordering these areas will determine the boundaries of closures. Prohibiting harvest for a long period of time may eliminate some striped bass trips altogether, and therefore reduce releases, during this period. Closures prohibiting recreational harvest in spawning areas have already been implemented by multiple states during Wave 1 (Jan-Feb) and/or during all or part of Wave 2 (Mar-Apr) (Figure 4).

B2-b. No-Targeting Spawning Closure Required: All recreational targeting of striped bass would be prohibited for a minimum two-week period on all spawning grounds (not necessarily the entire spawning area) during Wave 2 (March-April) or Wave 3 (May-June), as determined by states to align with peak spawning. States will determine the boundaries of spawning ground closures. Closures prohibiting recreational targeting on spawning grounds have already been implemented in Maine (Kennebec River), New Jersey (Delaware River), and Maryland (Chesapeake Bay) during part of Wave 2 and/or Wave 3 (Figure 4).

[15] For example, if sub-option B2-a was selected and a state already has a no-harvest closure in place for Waves 1 and 2, that state would already be considered in compliance with the closure requirement.

Figure 3. 2021 recreational seasons in ocean waters by state.

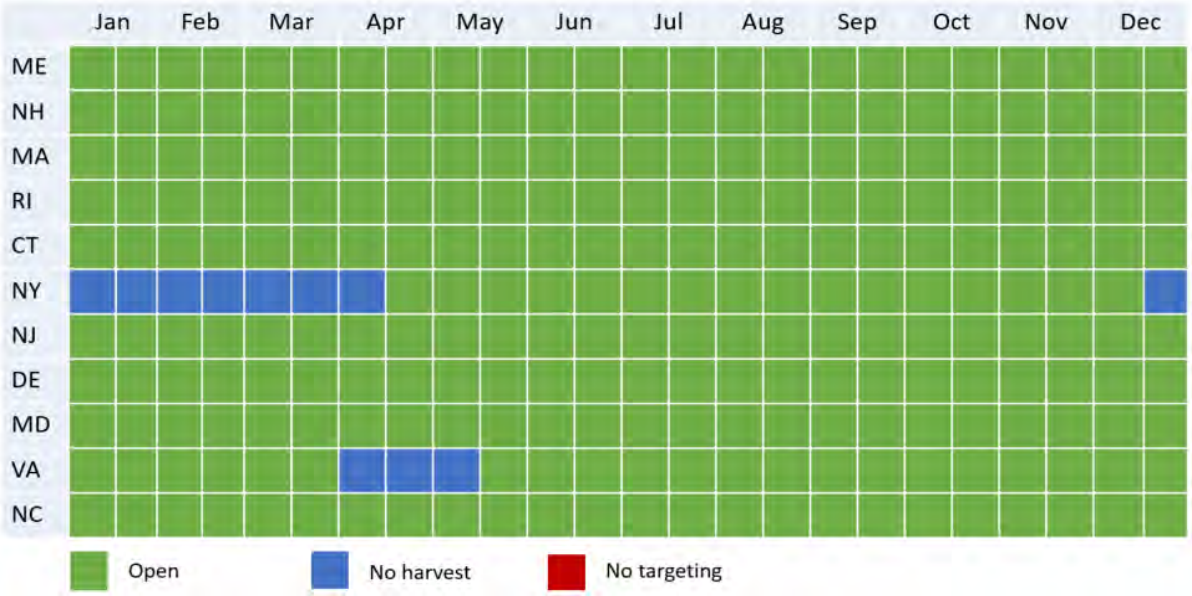
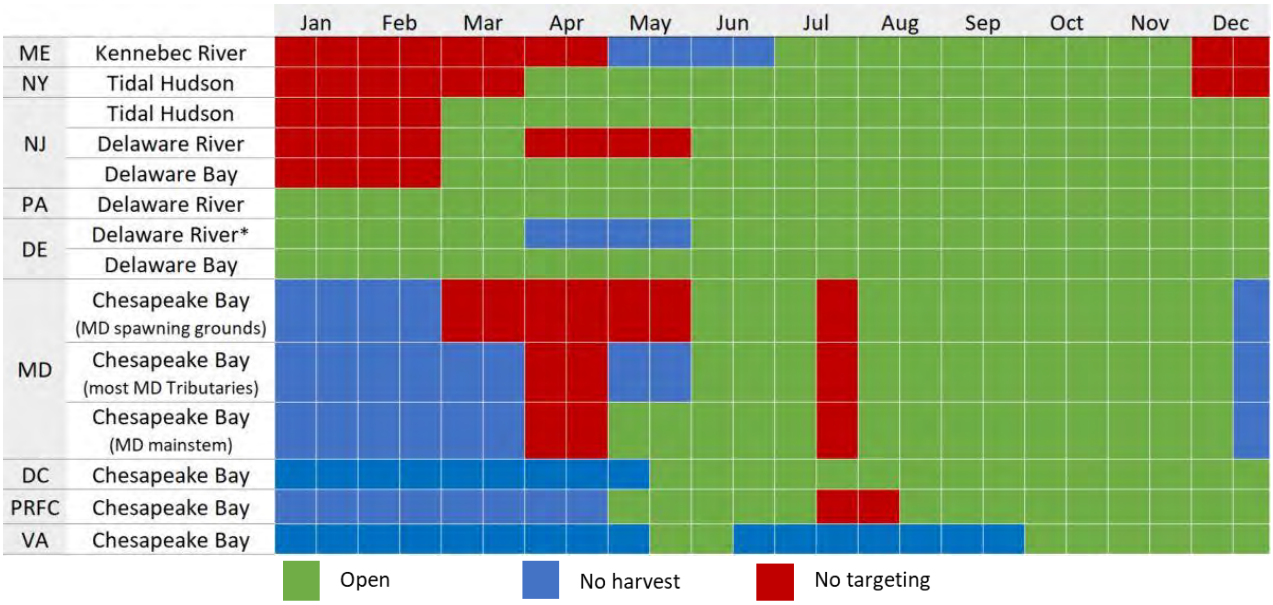


Figure 4. 2021 recreational seasons in the Kennebec River, Hudson River, Delaware River/Bay, and the Chesapeake Bay. Multiple states have spawning closures in place during the spawning season with spawning closure boundaries defined by those states.

Updated April 6, 2022: A correction was made to the New York Tidal Hudson section in Figure 4 showing the current closures in the Tidal Hudson in New York are no-targeting closures.



**In addition to Delaware's spawning closure in the Delaware River, the Nanticoke River and C & D Canal spawning grounds are also closed to harvest in Delaware during the spawning season.*

Note: Refer to Table 10 in Section 9.0 for recreational closure dates by state. Figures 3 and 4 summarize seasons for the recreational fishery only since Draft Amendment 7 considers seasonal closure options for the recreational fishery only. For a summary of commercial seasons by state, refer to Table 9 in Section 9.0.

Option C. Additional Gear Restrictions

In addition to the status quo circle hook requirement, the Board could consider additional gear restrictions outlined in the following options to increase the chance of survival of striped bass caught and released in the recreational fishery. The benefit of gear restrictions (i.e., how many additional fish could be saved) is difficult to quantify for several reasons, including: 1) it is unknown how many anglers already use these tactics; 2) possible non-compliance, especially with management measures that can only be observed on the-water and in real-time; and 3) enforcement challenges related to proving angler intent or target species (i.e., gear restrictions are difficult to enforce if the gear is acceptable to use when targeting a different species). Nonetheless, these options would be expected to result in a favorable trend towards a reduction in release mortality.

The Board may select one or both of the following sub-options C1 and C2.

> **Sub-option C1**: Recreational anglers would be prohibited from using any device other than a nonlethal device to remove a striped bass from the water or assist in the releasing of a striped bass. A non-lethal device means any tool used in the removal of striped bass from the water or to assist in the releasing of striped bass that does not pierce, puncture, or otherwise cause invasive damage to the fish that may result in its mortality. Some states already have regulations that ban the use of gaffs, but the language presented in this option would encompass a broader suite of lethal devices, including gaffs.
>
> **Sub-option C2**: Striped bass caught on any unapproved method of take would be returned to the water immediately without unnecessary injury. The Board approved this language on incidental catch as guidance to Addendum VI in March 2021; this guidance could not be a compliance criterion as part of Addendum VI since incidental catch was not originally part of Addendum VI. Selecting this option would make this incidental catch provision a requirement under Amendment 7 for striped bass that are incidentally caught on any unapproved method of take, including non-circle hooks with bait attached (as implemented through Addendum VI).

Option D. Outreach and Education

States have already implemented outreach and education campaigns related to the use and benefits of circle hooks and to encourage best handling and fishing practices, as recommended by Addendum VI. The following options are intended to more explicitly recognize those efforts as part of Amendment 7. ***The Board may select sub-option D1 or D2.***

> **Sub-option D1**: States would be required to promote best striped bass handling and release practices by developing public education and outreach campaigns. States must provide updates on public education and outreach efforts in annual state compliance reports. Best practices could include**:**

- Be attentive and set the hook immediately to prevent the fish from swallowing the hook (setting the hook is not necessary with circle hooks).
- If the hook is swallowed, do not forcefully remove it. Cut the line off as close to the mouth as possible and then release the fish.
- Leave the fish in the water when possible, including while removing the hook, to minimize stress and injury to the fish. If you need to remove the fish from the water, wet your hands or use a wet rag in order to preserve the protective mucous layer on the outside of the fish.
- Don't use the gills or eyes as a handhold. On larger fish, support under the belly.
- Reduce the fight time.
- Once an angler has retained their bag limit, consider targeting a different species.

Sub-option D2: It is recommended states continue to promote best striped bass handling and release practices by developing public education and outreach campaigns. States should provide updates on public education and outreach efforts in annual state compliance reports. Best practices could include those listed in sub-option D1.

4.3 COMMERCIAL FISHERY MANAGEMENT MEASURES

4.3.1 Size Limits

All commercial fisheries are required to maintain their 2017 size limits.[16]

4.3.2 Quota Allocation

Amendment 7 maintains the commercial quotas from Addendum VI to Amendment 6.[17] Table 4 provides the commercial quota in pounds for the ocean region and for Chesapeake Bay. The Chesapeake Bay commercial quota is allocated to Maryland, Virginia, and the Potomac River Fisheries Commission per the jurisdictions' mutual agreement. Table 5 provides each state's commercial quota for the ocean region.

[16] Some states have implemented alternative commercial size limits through conservation equivalency, which are maintained through current (approved in 2020) CE programs and state implementation plans from Addendum VI to Amendment 6. Refer to Table 9 in *Section 9.0* for each state's 2020 commercial regulations.

[17] Some states have implemented adjusted commercial quotas and/or reallocated commercial quota to the recreational sector through conservation equivalency, which are maintained through current (approved in 2020) CE programs and state implementation plans from Addendum VI to Amendment 6. Refer to Table 8 in *Section 9.0* for each state's quota for 2020, including CE-adjusted quotas where applicable.

Table 4. Ocean Region and Chesapeake Bay Commercial Quota

Region	Quota (Pounds of Fish)
Chesapeake Bay Total	2,588,603
Ocean Total	2,333,408

Table 5. Ocean region commercial quota.

State	Quota (Pounds of Fish)
Maine	154
New Hampshire	3,537
Massachusetts	713,247
Rhode Island	148,889
Connecticut	14,607
New York	652,552
New Jersey	197,877
Delaware	118,970
Maryland	74,396
Virginia	113,685
North Carolina	295,495
Ocean Total	2,333,408

Note: Refer to Table 8 in Section 9.0 for CE-adjusted quotas, where applicable, for fishing year 2020.

Quotas are allocated on a calendar year basis.[18] In the event a state exceeds its allocation, the amount in excess of its annual quota is deducted from the state's allowable quota in the following year.

4.3.2.1 Commercial Quota Transfers

Commercial quota transfers are not permitted. In August 2021, concurrent with the development of Draft Amendment 7, the Board initiated Addendum VII to Amendment 6 to consider allowing the voluntary transfer of commercial striped bass quota between states/jurisdictions that have commercial quota. In October 2021, the Board deferred consideration of Draft Addendum VII until May 2022.

[18] North Carolina's fishing year is December 1 – November 30.

4.4 REBUILDING PLAN

The 2018 benchmark stock assessment indicated the striped bass stock is overfished and experiencing overfishing relative to the updated reference points defined in the assessment. By accepting the assessment for management use in 2019, two management triggers were tripped requiring the Board to take action to address both the overfishing and overfished status determinations. Addendum VI was implemented in 2020 to address the overfishing status by implementing measures to reduce F back to F target in 2020. To address the overfished status, the Board must adjust the striped bass management program to rebuild SSB to the target level in a timeframe not to exceed 10 years, no later than 2029. Addendum VI measures are expected to contribute to stock rebuilding, and options for recreational fishery management measures in Draft Amendment 7, including measures to address release mortality (*Section 4.2.2*), could also support stock rebuilding, if implemented.

The stock rebuilding process is iterative in nature given the 10 year rebuilding horizon. The next stock assessment update (expected in 2022) will provide an updated evaluation of stock status that will incorporate two years of management and data under Addendum VI (2020-2021). The most recent estimates of SSB and F currently available for management use are from the 2018 benchmark stock assessment with a terminal year of 2017. The 2022 stock assessment update will provide estimates of SSB and F through 2021, and will update the SSB and F reference point values. Additionally, the 2022 stock assessment will calculate the F rate required to rebuild SSB to the SSB target by no later than 2029 (i.e., F rebuild). F rebuild is distinct from F target such that F target is the F rate required to achieve the SSB target in the long term, with no fixed rebuilding time frame. F rebuild may or may not be lower than F target.

This section includes options to consider which recruitment assumption to apply to rebuilding calculations. This section also outlines the rebuilding plan framework for responding to the 2022 stock assessment results, and considers how the Board could respond to the 2022 assessment if action is needed to achieve stock rebuilding by 2029.

4.4.1 Recruitment Assumption for Rebuilding Calculation

The Board has expressed concern about recent low recruitment estimates and the potential impact of low recruitment levels on the ability of the striped bass stock to rebuild by no later than 2029. Several years of poor recruitment may indicate the stock is entering a low recruitment regime, and levels of removals that were sustainable during average or above average recruitment regimes may not be sustainable in the future.

F rebuild could be calculated by drawing recruitment from the values observed from 1990 to the terminal year of the stock assessment (i.e., the standard recruitment method used in the striped bass stock assessment). However, if recruitment is only drawn from a below-average period instead of the full period from 1990-forward, for example, the F rebuild would be lower. If the population is fished at F rebuild using the standard recruitment method but average

recruitment remains lower than the time series mean, the population may not be able to rebuild to the SSB target by 2029.

As part of the analysis for alternative recruitment trigger options (*Section 4.1*), the TC conducted a change point analysis of the Maryland juvenile abundance index (JAI) to identify periods of high and low recruitment. This analysis (based on JAI data through 2020) identified 1992-2006 as a high recruitment period (i.e., high recruitment regime) and 2007-2020 as a low recruitment period (i.e., low recruitment regime). This translates to years 1993-2007 and 2008-2017 for age-1 model estimates of recruit abundance; the age-1 model estimate of recruit abundance will be updated to include estimates through 2021 during the 2022 assessment.

The following options consider which recruitment assumption would be applied to the rebuilding calculations and projections for the 2022 stock assessment update:

> **Option A (Status Quo)**: Rebuild female SSB to the SSB target level by no later than 2029. F rebuild is calculated to achieve the SSB target by no later than 2029 using the standard recruitment method from the stock assessment.
>
> **Option B**: Rebuild female SSB to the SSB target level by no later than 2029. F rebuild is calculated to achieve the SSB target by no later than 2029 using the low recruitment regime assumption as identified by the change point analysis. Note: This approach is more conservative than Option A. Using the low recruitment assumption in Option B would likely result in a lower F rebuild than under Option A. To achieve a lower F rebuild (i.e., a lower level of fishery removals), more restrictive management measures may be required if Option B is selected as compared to Option A.

4.4.2 Rebuilding Plan Framework

The rebuilding plan framework (Figure 5) specifies how the recruitment assumption selected as part of Amendment 7 (options described in the preceding section) will inform rebuilding calculations and projections in the 2022 assessment update, which will then determine whether action is needed in response to the assessment results.

If the 2022 assessment indicates Amendment 7 management measures (i.e., status quo recreational size/bag limits and status quo commercial measures) are not projected to achieve stock rebuilding by 2029, the Board will need to consider adjusting measures to achieve the rebuilding target. The TC would calculate the percent reduction in removals required to achieve F rebuild, and the Board would then consider new management measures designed to achieve that reduction and achieve F rebuild.

The following options consider the process for how the Board would respond to the 2022 stock assessment if a reduction is needed to achieve stock rebuilding by 2029. The Board is considering these options to potentially allow for a more timely response to the 2022 assessment if a reduction is needed.

Option A (Status Quo): If the 2022 stock assessment results indicate the Amendment 7 measures are not projected to achieve stock rebuilding by 2029 (as calculated using the recruitment assumption specified in Amendment 7), the Board would initiate and develop an addendum to consider adjusting management measures to achieve F rebuild.

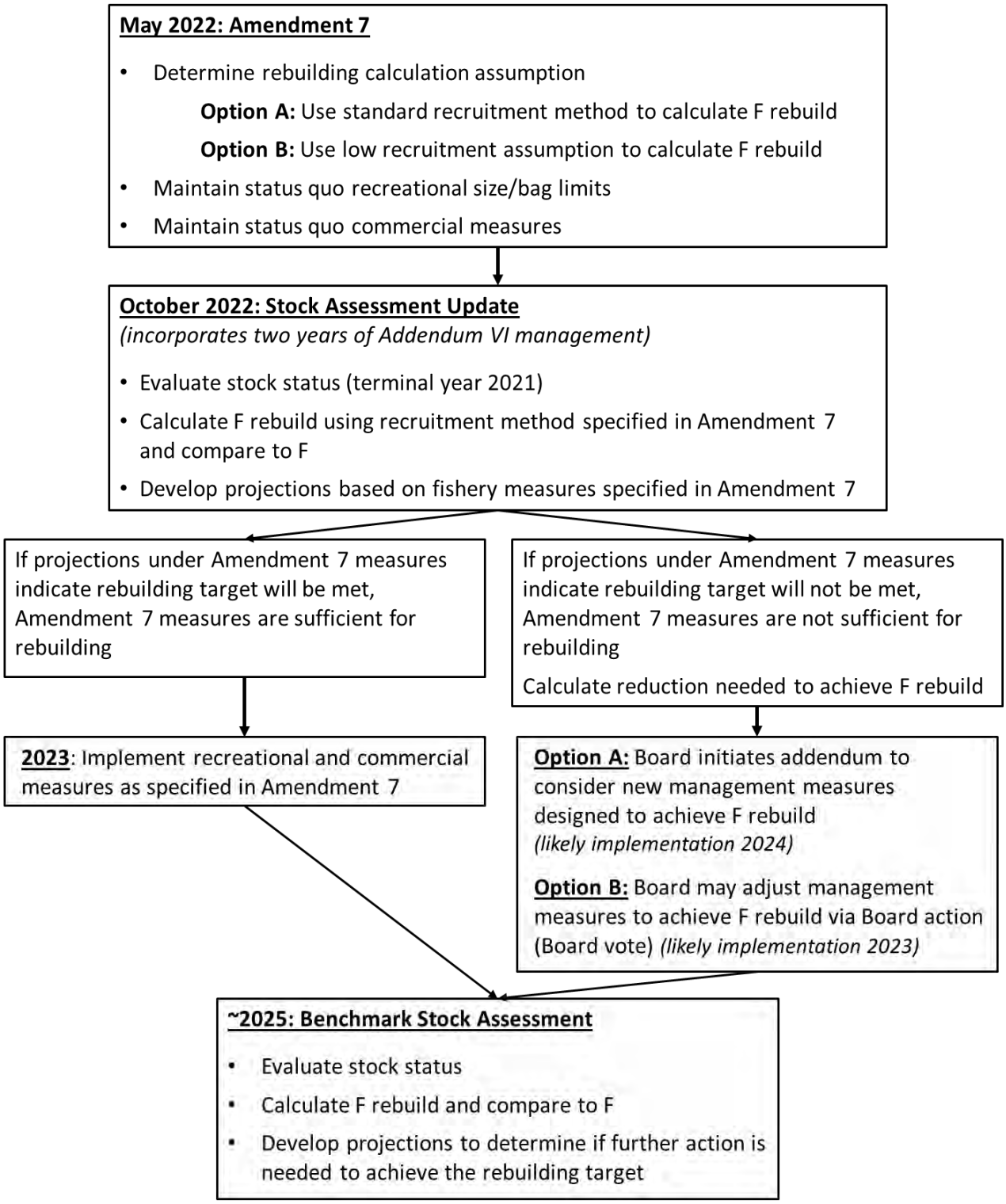
- Under this option, an addendum specifying new management measures could be approved as early as May 2023 with likely implementation in 2024.
- An addendum process includes a public comment period with public hearings and an opportunity to submit written comment on the draft addendum document.

Option B: If the 2022 stock assessment results indicate the Amendment 7 measures have less than a 50% probability of rebuilding the stock by 2029 (as calculated using the recruitment assumption specified in Amendment 7) and if the stock assessment indicates at least a 5% reduction in removals is needed to achieve F rebuild, the Board may adjust measures to achieve F rebuild via Board action.

- Under this option, the Board could take action to change management measures in response to the 2022 assessment by voting to pass a motion at a Board meeting; if a Board motion specifying new management measures was passed in 2022, new management measures could likely be implemented for at least part of the 2023 fishing season.
- Under this option, public comment could be provided during Board meetings per the Commission's guidelines for public comment at Board meetings, and/or public comment could be provided in writing to the Board per the Commission's timeline for submission of written public comments prior to Board meetings.

This section continues on the next page.

Figure 5. Framework to rebuild to SSB target level by no later than 2029.



4.5 HABITAT CONSERVATION AND RESTORATION RECOMMENDATIONS

Each State should engage their county, township, and other local jurisdictions to implement protection for striped bass habitat to ensure the sustainability of that portion of the migratory or resident stock. Such a program should inventory historical habitats, identify habitats presently used, specify those targeted for recovery, and impose or encourage measures to retain or increase the quantity and quality of striped bass essential habitats.

Habitats essential for maintaining striped bass populations include spawning, nursery, wintering areas, and migration corridors. Each state jurisdiction should monitor those habitats located within state waters to ensure adequate water and substrate quality; the quantity, timing, and duration of freshwater flows into spawning and nursery areas; water, substrate quality, and integrity of wintering areas; and open and free access to migration corridors, especially ocean inlets. Federal agencies should work with state partners in addressing these needs in state waters and in the EEZ. State and Federal agencies should partner to develop detailed maps of striped bass habitat use, by life stage, to provide a basis for regulatory review of proposed federal or state actions which could adversely affect striped bass populations. Parameters of particular concern to which jurisdictions should be attentive include nutrient loading, long-term adverse changes in water quality, hypoxia events, substrate extraction in areas used by striped bass (e.g., proposed Corps of Engineers sand mining off NJ and NC, as well as navigational dredging), and projects which could potentially jeopardize striped bass habitat quality or access.

4.5.1 Preservation of Existing Habitat

1) States in which striped bass spawning occurs should notify in writing the appropriate federal and state regulatory agencies of the locations of habitats used by striped bass. Regulatory agencies should be advised of the types of threats to striped bass populations and recommended measures which should be employed to avoid, minimize, or eliminate any threat to current habitat quantity or quality.

2) Where available, States should seek to designate striped bass essential habitats for special protection. Tools available include High Quality Waters, Outstanding Resource Waters, and Fish Habitats of Concern (as defined by ASMFC, in preparation) designations. Designations should, where possible, be accompanied by requirements of nondegradation of habitat quality, including minimization of nonpoint source runoff, prevention of significant increases in contaminant loadings, and prevention of the introduction of any new categories of contaminants into the area (via restrictions on National Pollutant Discharge Elimination System (NPDES) discharge permits for facilities in those areas).

3) State fishery regulatory agencies should develop protocols and schedules for providing input on water quality regulations to the responsible agency, to ensure that water quality needs for striped bass are met.

4) State fishery regulatory agencies should develop protocols and schedules for providing input on Federal permits and licenses required by the Clean Water Act, Federal Power Act, and other appropriate vehicles, to ensure that striped bass habitats are protected.

5) Water quality criteria for striped bass spawning and nursery areas should be established or existing criteria should be upgraded to levels which are sufficient to ensure successful reproduction. Any action taken should be consistent with Federal Clean Water Act guidelines and specifications.

6) All State and Federal agencies responsible for reviewing impact statements and permit applications for projects or facilities proposed for striped bass spawning and nursery areas should ensure that those projects will have no or only minimal impact on local stocks. Natal rivers of stocks considered depressed or undergoing restoration are of special concern. Any project which would result in the elimination of essential habitat should be avoided.

7) State agencies should engage with local jurisdictions during comprehensive development planning to ensure impacts to striped bass spawning and nursery areas are avoided or minimized.

4.5.2 Habitat Restoration and Improvement

1) Each State should survey existing literature and data to determine the historical extent of striped bass occurrence and use within its jurisdiction. An assessment should be conducted of those areas not presently used for which restoration is feasible.

2) Every effort should be made to eliminate existing contaminants from striped bass habitats where a documented adverse impact occurs (e.g., PCBs from the Hudson River).

3) States should work in concert with the USFWS and NMFS, Office of Habitat Conservation, to identify federally-regulated hydropower dams which pose significant impediment to striped bass migration and target them for appropriate recommendations during FERC relicensing.

4.5.3 Avoidance of Incompatible Activities

1) Federal and State fishery management agencies should take steps to limit the introduction of compounds which are known to be accumulated in striped bass tissues and which pose a threat to striped bass health or human health.

2) Each State should establish windows of compatibility for activities known or suspected to adversely affect striped bass such as navigational dredging, bridge construction, and dredged material disposal and notify the appropriate construction or regulatory agencies in writing.

3) Projects involving water withdrawal (e.g., power plants, irrigation, water supply projects) should be scrutinized to ensure that adverse impacts resulting from impingement, entrainment,

and/or modification of flow and salinity regimes due to water removal will not adversely impact on striped bass stocks.

4) Each state which encompasses spawning rivers within its jurisdiction should develop water use and flow regime guidelines which are protective of striped bass spawning and nursery areas, and which will ensure the long-term health and sustainability of the stock.

4.5.4 Fishery Practices

The use of any fishing gear deemed by management agencies to have an unacceptable impact on striped bass habitat should be prohibited within appropriate essential habitats (e.g., trawling in spawning areas or primary nursery areas should be prohibited).

4.6 ALTERNATIVE STATE MANAGEMENT REGIMES

Once approved by the Atlantic Striped Bass Management Board, a state may not amend its regulatory program without the approval of the Board, except when implementing more restrictive measures. All other proposed changes to state regulations must be submitted in writing to the Commission. When implementing more restrictive measures, states should notify the Commission of the new measures in its annual compliance report.

Under no circumstances will states be allowed to institute minimum sizes below 18 inches in alternative management regimes.

4.6.1 General Procedures

A state may submit a proposal for a change to its regulatory program or any mandatory compliance measure under this amendment to the Commission. Such changes shall be submitted to the Chair of the Plan Review Team (PRT), who shall distribute the proposal to appropriate groups, including the Board, the PRT, the TC, and the Advisory Panel (AP).

The PRT is responsible for gathering the comments of the TC and the AP. The PRT is also responsible for presenting these comments to the Board for decision.

The Board will decide whether to approve the state proposal for an alternative management program if it determines that it is consistent with the management program detailed in this Amendment.

4.6.2 Management Program Equivalency

Management program equivalency (also known as "conservation equivalency" or CE) refers to actions taken by a state which differ from the specific requirements of the FMP, but which achieve the same quantified level of conservation for the resource under management. It is the responsibility of the state to demonstrate that the proposed management program is equivalent to the FMP standards and consistent with the restrictions and requirements for CE determined by the Board.

The Commission's Conservation Equivalency Policy and Technical Guidance Document (CE Guidance Document) provides specific guidance on development, submission, review and approval of CE proposals[19].

Option A (Status Quo): Board Discretion on Conservation Equivalency Restrictions and Requirements

The Board will determine conservation equivalency. The Board has final discretion regarding the use of CE and approval of CE programs. The Board may restrict the use of CE on an ad hoc basis for any FMP requirement. Restrictions may include, but are not limited to:

- measures that are not applicable for CE;
- restrictions on rationale for pursuing CE;
- limitations on the range of measures that may be proposed (e.g., maximum or minimum size limits)
- the definition of "equivalency" (e.g., based on harvest or total removals; achieving the predicted state-specific or coastwide reduction);
- minimum levels of precision for catch and effort data used in CE proposals;
- whether proposals must include an uncertainty buffer on the reduction/liberalization target;
- if states may implement, without further Board review, alternative measures than those specifically approved by the Board if developed using the same methodology; and
- if additional sampling or fishery monitoring is required.

When setting restrictions, the Board should consider such factors as stock status, stock structure, data availability, range of species, socio-economic information, and management goals and objectives.

The following sets of options consider whether to adopt new default restrictions or requirements for the use of CE (Options B–E). Sub-options selected under Options B–E would automatically apply to new FMP standards approved through Amendment 7 and all

[19] As of September 2021, the CE Guidance Document is under review for potential updates.

subsequent management actions and CE proposals; additional restrictions and requirements for the use of CE could be identified on an ad hoc basis per the Board's discretion (as described above under the Status Quo option). Options B-E are intended to address concerns about the use of CE at the front-end of the CE process (i.e., considering when CE can be used and requirements for CE proposals).[20] For each Option B–E, the Board may select one or more sub-options, as applicable. If a sub-option is not selected under an option, the Status Quo (Board discretion) remains in place on that issue.

To inform consideration of these options, Table 6 outlines the CE programs implemented for Addendum VI.[21]

Table 6. CE programs implemented for Addendum VI

State	Recreational Fisheries	Commercial Fisheries
MA	N/A	Changed size limit (35" minimum) with equivalent quota change
NY	Hudson River: Alternative size limit (18" to 28") to achieve 18% removals reduction in combination with standard Ocean slot	Changed size limit (26" to 38") with equivalent quota reduction
NJ	Alternative size limit (28 to < 38") to achieve 25% removals reduction	Decreased commercial quota reduction (to 0%) with surplus recreational fishery reduction and transferred commercial quota to recreational bonus program fishery (24 to < 28", 1 fish/day)
PA	DE River and Estuary downstream Calhoun St Bridge: Alternative size and bag limit on limited seasonal basis (2 fish/day at 21 to <24" during 4.1–5.31) to achieve 18% removals reduction	N/A
DE	DE River/Bay/tributaries: Alternative slot on limited seasonal basis (20" to <25" during 7.1–8.31) to achieve 20.4% removals reduction in combination with standard Ocean slot	Decreased commercial quota reduction (to -1.8%) with surplus recreational fishery reduction

[20] It is difficult to evaluate the effectiveness of CE programs and their equivalency to the FMP standard after program implementation due to the challenge of separating the performance of management measures and outside variables (like angler behavior and availability of fish). Because of this, options for CE accountability were not developed.

[21] The conflict between allowing flexibility through CE and achieving regulatory consistency among states was most recently realized with the implementation of Addendum VI to Amendment 6. For the recreational fishery, the Addendum implemented measures to reduce recreational removals by 18% coastwide. However, at the state level, some states were predicted to reduce removals by more than 18% (and some by less), but CE proposals only had to achieve an 18% reduction regardless. Also, a majority of states pursued CE and submitted a large number of options for TC review, which raised questions for additional guidelines regarding the development of CE proposals.

Table 6 (continued). CE programs implemented for Addendum VI

MD	Chesapeake Bay: Alternative Summer/Fall for-hire bag limit with restrictions (2 fish, only 1 >28", no captain retention) through increased minimum size (19"), April and two-week Wave 4 targeting closures, and shorter spring trophy season (May 1–15) to achieve 20.6% removals reduction; Ocean: FMP standard slot	Decreased Ocean and Chesapeake Bay commercial quota reduction (to -1.8%) with surplus Chesapeake Bay recreational fishery reduction
PRFC	Alternative Summer/Fall minimum size and bag limit (20" min, 2 fish/day) with a no targeting closure (7.7–8.20) and shorter spring trophy season (May 1–15) to achieve a 20.5% removals reduction	Decreased Chesapeake Bay commercial quota (to -1.8%) with surplus recreational fishery reduction
VA	Chesapeake Bay: Alternative slot limits during 5.16–6.15 (20" to 28") and 10.4–12.31 (20" to 36") and no spring trophy season to achieve a 23.4% removals reduction (reduction was the result of lowering prior bag limit from 2 to 1-fish per angler); Ocean: Alternative slot limit (28" to 36")	Decreased Ocean commercial quota (to -7.7%) and Chesapeake Bay commercial quota (to -9.8%) with surplus recreational fishery reduction

Option B. Restrict the Use of Conservation Equivalency Based on Stock Status
The following options would establish default restrictions on the use of CE for certain fisheries depending on striped bass stock status, as determined by the results of the most recent benchmark stock assessment or assessment update reviewed by the Board. When the stock conditions are met, CE programs would not be approved. Currently existing CE programs would remain in place until Board action is taken on new FMP standards relevant to the specific fishery.

Sub-option B1. Restrictions: CE programs would not be approved when *[sub-options B1-a and B1-b are mutually exclusive; sub-option B1-c may be selected alone or in addition to sub-option B1-a or B1-b]:*

Sub-option B1-a: the stock is at or below the biomass threshold (i.e., overfished). CE programs would not be considered until a subsequent stock assessment indicates stock biomass is above the threshold level.

Sub-option B1-b: the stock is below the biomass target. CE programs would not be considered until a subsequent stock assessment indicates the stock biomass is at or above the target level.

Sub-option B1-c: fishing mortality is at or above the fishing mortality threshold (i.e., overfishing is occurring). CE programs would not be considered until a subsequent stock assessment indicates fishing mortality is below the threshold level.

The stock status restriction(s) selected in Option B1 would apply (at a minimum) to the non-quota managed recreational fisheries in the Ocean region and Chesapeake Bay region, with the exception of the Hudson River, Delaware River, and Delaware Bay recreational fisheries. Most of the concerns surrounding CE, as identified during scoping on the Draft Amendment 7 Public Information Document, pertain to non-quota managed fisheries due to use of uncertain data, modeling assumptions, and challenges measuring the effectiveness of the program post-implementation. Quota-managed fisheries (including commercial fisheries as well as recreational "bonus program" fisheries that operate on a fixed harvest limit with transferred commercial quota[22]) remain accountable to a CE-adjusted quota using census level harvest data. However, non-quota managed fisheries have a CE-adjusted removals target that may be exceeded as subsequently determined by survey-based catch estimates. Commercial state-by-state quota management is also characterized by a wide range of fishery measures (with regards to trip limits, seasons, and gear types) among the states regardless of CE programs being in place, which may have contributed to the minimal concern directed at commercial fishery CE programs.[23] Additionally, the public's concerns were seldom focused on long-standing management program equivalencies for the recreational fisheries in the Hudson River, Delaware River, and Delaware Bay that (due to the size availability of fish in these areas) allow harvest of smaller fish than would otherwise be permitted under the ocean region's measures, hence their exemption here. However, the Board may choose to add to the default list of affected fisheries through Option B2.

Sub-option B2. Applicability: The stock status restrictions selected in Option B1 would apply to the following additional fisheries *[one or more sub-options may be selected]*:

> **Sub-option B2-a**: the Hudson River, Delaware River, and Delaware Bay recreational fisheries
>
> **Sub-option B2-b**: quota-managed recreational fisheries (e.g., "bonus programs")
>
> **Sub-option B2-c**: commercial fisheries (all of which are quota managed)

[22] Currently, only New Jersey operates such a recreational bonus program using commercial quota. Connecticut formerly operated a bonus program but suspended it indefinitely in 2020. Such programs are classified herein as commercial CE programs due to commercial quota basis.

[23] States which have different commercial size limits than the FMP standard (i.e., different from the size limits implemented in 2017) through CE at the time this Amendment was developed include Massachusetts and New York.

Option C. Precision Standards for MRIP Estimates Used in Conservation Equivalency Proposals
The following options would establish default precision standards for MRIP catch and effort estimates used in CE proposals. The options are based on the percent standard error (PSE, a measure of precision) associated with MRIP estimates. NMFS warns that "[MRIP] Estimates should be viewed with increasing caution as PSEs increase beyond 30. Large PSEs—those above 50—indicate high variability around the estimate and therefore low precision."[24] In addition, NMFS is implementing new Recreational Fishing Survey and Data Standards under which estimates will not be published if the PSE is greater than 50 and estimates with a PSE of 30 or greater will be presented with a warning that they "are not considered sufficiently reliable for most purposes, and should be treated with caution".[25]

CE proposals would not be able to use MRIP estimates associated with a PSE exceeding *[only one sub-option may be selected]*:

Sub-option C1: 50

Sub-option C2: 40

Sub-option C3: 30

All MRIP datasets used in CE proposals would be subject to this precision standard. For example, if a CE proposal uses wave- and/or mode-specific data, the PSEs associated with those specific data cannot exceed the selected precision standard.

Should states find themselves unable to propose certain CE programs because of the MRIP precision standard, they are encouraged to increase MRIP Access Point Angler Intercept Survey (APAIS) sampling to improve the PSE associated with their state's MRIP estimates. Increased APAIS sampling is recommended for all states, as resources allow, regardless of CE programming.

Option D. Conservation Equivalency Uncertainty Buffer for Non-Quota Managed Fisheries
The following options would establish a default uncertainty buffer for CE proposals for non-quota managed fisheries. An uncertainty buffer is intended to increase the alternative measures' probability of success in achieving equivalency with the FMP standard (i.e., not exceeding a harvest or removals target). CE programs for quota-managed fisheries have reactive accountability measures of in-season quota monitoring and closures when the quota is reached, and paying back quota overages in the subsequent year. The uncertainty buffer would provide a proactive accountability measure for non-quota managed fisheries operating under CE programs that are not subject to such reactive accountability measures.

[24] See: www.fisheries.noaa.gov/data-tools/recreational-fisheries-statistics-queries
[25] See: www.fisheries.noaa.gov/recreational-fishing-data/recreational-fishing-survey-and-data-standards

Proposed CE programs for non-quota managed fisheries would be required to include an uncertainty buffer of *[only one sub-option may be selected]*:

Sub-option D1: 10%

Sub-option D2: 25%

Sub-option D3: 50%

When CE is pursued to implement new FMP requirements, the uncertainty buffer applies to the percent reduction required or liberalization allowed for the non-quota managed fishery (after any potential transfer of reduction/liberalization between fisheries). For example, if a 20% reduction is required with a 10% uncertainty buffer, CE proposals would need to demonstrate a 22% reduction. Similarly, if a 20% liberalization is allowed with a 10% uncertainty buffer, proposed CE proposals may demonstrate up to an 18% liberalization. The uncertainty buffer still applies when CE is requested separate from an implementation plan (e.g., a CE proposal submitted after a required 20% reduction was implemented would need to demonstrate a 2% reduction rather than no change).

The Board may need to further determine how the buffer is applied for some future management actions, particularly when CE proposals may include measures for both quota-managed and non-quota managed fisheries (e.g., if a reduction can be split between sectors). The Board may request guidance from the TC and/or PRT.

Option E. Definition of Equivalency for CE Proposals with Non-Quota Managed Fisheries
The following options would establish a default definition of what "equivalency" means for CE proposals associated with the implementation of coastwide actions (in non-quota managed fisheries). In other words, the percent reduction or liberalization that must be met in a CE proposal when the FMP standard is projected to have different effects at the coastwide and state-specific levels. The intent is to add transparency and consistency to the use of CE across management actions. Refer to Table 7 for an example of how these options would apply.

Proposed CE programs would be required to demonstrate equivalency to *[only one sub-option may be selected]:*

Sub-Option E1: the percent reduction/liberalization projected for the FMP standard at the coastwide level. (This represents the requirements for CE under Addendum VI to Amendment 6.)

Sub-option E2: the percent reduction/liberalization projected for the FMP standard at the state-specific level.

Table 7. *This table provides a hypothetical example to explain the difference between sub-option E1 and E2. Suppose an FMP standard is adopted that is projected to achieve a 20% change in fishery removals when applied coastwide. However, at the state level, the FMP standard is projected to achieve a 25% change in State A and a 10% change in State B. The sub-options vary in the amount of change that State A and State B would need to demonstrate when pursuing alternative measures to the FMP standard through CE.*

Notably, sub-option E1 may undermine an overall targeted reduction (due to State A's CE) or lead to exceeding an overall targeted liberalization (due to State B's CE). Sub-option E1 may make it impossible for State B to apply for CE under a reduction scenario (no way to meet the higher coastwide reduction amount). Sub-option E2 holds State A's CE to a greater reduction than the coastwide standard, but would allow a greater liberalization than the coastwide standard as well. Sub-option E1 represents the requirements for CE under Addendum VI to Amendment 6.

	State Change to be Demonstrated in a CE Proposal under Each Sub-option	
FMP Standard achieves a 20% change when applied coastwide	Sub-option E1: Use coastwide change	Sub-option E2: Use state-specific change
State A (25% state change under FMP standard)	20%	25%
State B (10% state change under FMP Standard)	20%	10%

4.6.3 *De Minimis* Fishery Guidelines

The ASMFC Interstate Fisheries Management Program Charter (ISFMP Charter) defines *de minimis* as "a situation in which, under the existing condition of the stock and scope of the fishery, the conservation and enforcement actions taken by an individual state would be expected to contribute insignificantly to a coastwide conservation program required by a Fishery Management Plan or amendment," (ASMFC 2016).

4.6.3.1 Qualifications for De Minimis

States may apply for *de minimis* status if, for the last two years, their combined average commercial and recreational landings (by weight) constitute less than one percent (1%) of the coastwide commercial and recreational landings for the same two-year period. When petitioning for *de minimis* status, the state should also propose the type of exemption associated with *de minimis* status. In addition to determining if the state meets the criteria for *de minimis* status, the Board will evaluate the proposed exemption to be certain it does not compromise the goals and objectives of Amendment 7. The States may petition the Atlantic Striped Bass Management Board at any time for *de minimis* status, if their fishery falls below the threshold level. Once *de minimis* status is granted, designated states must submit annual reports to the Management Board justifying the continuance of *de minimis* status. States must include *de minimis* requests as part of their annual compliance reports.

4.6.3.2 Procedure to Apply for De Minimis Status

States must specifically request *de minimis* status each year. Requests for *de minimis* status will be reviewed by the PRT as part of the annual FMP review process (*Section 5.3: Compliance Reports*). Requests for *de minimis* must be submitted to the ASMFC Atlantic Striped Bass FMP Coordinator as a part of the state's yearly compliance report. The request must contain the following information: all available commercial landings data for the current and 2 previous full years of data, commercial and recreational regulations for the current year, and the proposed management measures the state plans to implement for the year *de minimis* status is requested. The FMP Coordinator will then forward the information to the PRT.

In determining whether or not a state meets the *de minimis* criteria, the PRT will consider the information provided with the request, the most recent available coastwide landings data, any information provided by the TC and SAS, and any additional information deemed necessary by the PRT. The PRT will make a recommendation to the Board to either accept or deny the *de minimis* request. The Board will then review the PRT recommendation and either grant or deny the *de minimis* classification.

The Board must make a specific motion to grant a state *de minimis* status, including the measures the state would be excused from implementing. The state should request which measures they would like to be excused from as part of the *de minimis* request.

If landings in a *de minimis* state exceed the *de minimis* threshold, the state will lose its *de minimis* classification, will be ineligible for *de minimis* in the following year, and will be required to implement all provisions of the FMP. If the Board denies a state's *de minimis* request, the state will be required to implement all the provisions of the FMP. When a state rescinds or loses its *de minimis* status, the Board will set a compliance date by which the state must implement the required regulations.

If the coastwide fishery is closed for any reason through Emergency Procedures (*Section 4.7*), *de minimis* states must close their fisheries as well.

Any additional components of the FMP, which the Board determines necessary for a *de minimis* state to implement, can be defined at the time *de minimis* status is granted.

4.7 ADAPTIVE MANAGEMENT

The Board may vary the requirements specified in this Amendment as a part of adaptive management in order to conserve the Atlantic striped bass resource. The elements that can be modified by adaptive management are listed in *Section 4.7.2*. The process under which adaptive management can occur is provided below.

4.7.1 General Procedures

The PRT will monitor the status of the fishery and the resource and report on that status to the Board annually or when directed to do so by the Board. The PRT will consult with TC, the SAS, and the AP in making such review and report.

The Board will review the report of the PRT, and may consult further with the TC, SAS, or AP. The Board may, based on the PRT report or on its own discretion, direct the PDT to prepare an addendum to make any changes it deems necessary. The addendum shall contain a schedule for the states to implement the new provisions.

The PDT will prepare a draft addendum as directed by the Board, and shall distribute it to all states for review and comment. A public hearing will be held in any state that requests one. The PDT will also request comment from federal agencies and the public at large. After a 30-day review period, staff, in consultation with the PDT, will summarize the comments received and prepare a final version of the addendum for the Board.

The Board shall review the final version of the addendum prepared by the PDT, and shall also consider the public comments received and the recommendations of the TC, LEC, and AP. The Board shall then decide whether to adopt, or revise and then adopt, the addendum.

Upon adoption of an addendum by the Board, states shall prepare plans to carry out the addendum, and submit them to the Board for approval according to the schedule contained in the addendum.

4.7.2 Measures Subject to Change

The following measures are subject to change under adaptive management upon approval by the Board:

(1) Goal
(2) Objectives
(3) Management areas and unit
(4) Reference points, including:
    (a) overfishing and overfished definition
    (b) region-specific reference points
(5) Rebuilding targets and schedules
(6) Management triggers and planning horizon
(7) Recreational Fishery Management Measures
(8) Commercial Fishery Management Measures, including:
    (a) commercial quota allocation
(9) Management Program Equivalency
(10) Recommendations to the Secretaries for complementary actions in federal jurisdictions
(11) Any other management measures currently included in Amendment 7

4.8 EMERGENCY PROCEDURES

Emergency procedures may be used by the Board to require any emergency action that is not covered by, is an exception to, or a change to any provision in Amendment 7. Procedures for implementation are addressed in the ASMFC Interstate Fisheries Management Program Charter, Section Six (c)(10) (ASMFC 2016).

4.9 MANAGEMENT INSTITUTIONS

The management institutions for Atlantic striped bass shall be subject to the provisions of the ISFMP Charter (ASMFC 2016). The following is not intended to replace any or all of the provisions of the ISFMP Charter. All committee roles and responsibilities are included in detail in the ISFMP Charter and are only summarized here.

4.9.1 Atlantic States Marine Fisheries Commission and ISFMP Policy Board

The ASMFC (Commission) and the ISFMP Policy Board are generally responsible for the oversight and management of the Commission's fisheries management activities. The Commission must approve all fishery management plans and amendments, including Amendment 7. The ISFMP Policy Board reviews any non-compliance recommendations of the various Boards and, if it concurs, forwards them to the Commission for action.

4.9.2 Atlantic Striped Bass Management Board

The Board was established under the provisions of the Commission's ISFMP Charter (Section Four; ASMFC 2016) and is generally responsible for carrying out all activities under this Amendment.

The Board establishes and oversees the activities of the PDT, PRT, TC, SAS, Tagging Subcommittee, and the AP. In addition, the Board makes changes to the management program under adaptive management, reviews state programs implementing the amendment, and approves alternative state programs through conservation equivalency. The Board reviews the status of state compliance with the management program annually, and if it determines that a state is out of compliance, reports that determination to the ISFMP Policy Board under the terms of the ISFMP Charter.

4.9.3. Atlantic Striped Bass Plan Development Team

The Plan Development Team (PDT) is composed of personnel from state and federal agencies who have scientific knowledge of Atlantic striped bass and management abilities. The PDT is responsible for preparing and developing management documents, including addenda and amendments, using the best scientific information available and the most current stock assessment information. The ASMFC FMP Coordinator chairs the PDT. The PDT will either disband or assume inactive status upon completion of Amendment 7.

4.9.4 Atlantic Striped Bass Plan Review Team

The Plan Review Team (PRT) is composed of personnel from state and federal agencies who have scientific and management ability and knowledge of Atlantic striped bass. The PRT is responsible for providing annual advice concerning the implementation, review, monitoring, and enforcement of Amendment 7 once it has been adopted by the Commission. After final action on Amendment 7, the Board may elect to retain members of the PDT as members of the PRT, or appoint new members.

4.9.5 Atlantic Striped Bass Technical Committee

The Atlantic Striped Bass Technical Committee (TC) consists of representatives from state or federal agencies, Regional Fishery Management Councils, the Commission, a university, or other specialized personnel with scientific and technical expertise, and knowledge of the Atlantic striped bass fishery. The Board appoints the members of the TC and may authorize additional seats as it sees fit. The role of the TC is to assess the species' population, provide scientific advice concerning the implications of proposed or potential management alternatives, and respond to other scientific questions from the Board, PDT, or PRT. The SAS reports to the TC.

4.9.6 Atlantic Striped Bass Stock Assessment Subcommittee

The Atlantic Striped Bass Stock Assessment Subcommittee (SAS) is appointed and approved by the Board, with consultation from the Atlantic Striped Bass TC, and consists of scientists with expertise in the assessment of the Atlantic striped bass population. Its role is to assess the Atlantic striped bass population and provide scientific advice concerning the implications of proposed or potential management alternatives, and to respond to other scientific questions from the Board, TC, PDT or PRT. The SAS reports to the TC.

4.9.7 Atlantic Striped Bass Tagging Subcommittee

The Tagging Subcommittee will consist of those scientists with the expertise in analysis of tag and recapture data for striped Bass. Its role is to assess the available data for inclusion in the assessment of the striped bass populations, which will be provided to the Stock Assessment Subcommittee for inclusion in the annual status of the stock report. The Tagging Subcommittee is also responsible for responding to Management Board questions using the available tagging data, when possible. The Tagging Subcommittee will report to the TC.

4.9.8 Atlantic Striped Bass Advisory Panel

The Atlantic Striped Bass Advisory Panel (AP) is established according to the Commission's Advisory Committee Charter. Members of the AP are citizens who represent a cross-section of commercial and recreational fishing interests and others who are concerned about Atlantic

striped bass conservation and management. The AP provides the Board with advice directly concerning the Commission's Atlantic striped bass management program.

4.9.9 Federal Agencies

4.9.9.1 Management in the Exclusive Economic Zone

Management of Atlantic striped bass in the EEZ is within the jurisdiction of the three Regional Fishery Management Councils under the Magnuson-Stevens Act (16 U.S.C. 1801 et seq.). In the absence of a Council Fishery Management Plan, management is the responsibility of the National Marine Fisheries Service as mandated by the Atlantic Coastal Fishery Cooperative Management Act.

4.9.9.2 Consultation with Fishery Management Councils

At the time of adoption of Amendment 7, none of the Regional Fishery Management Councils had implemented a management plan for Atlantic striped bass, nor had they indicated an intent to develop a plan.

4.10 RECOMMENDATION TO THE SECRETARY OF COMMERCE FOR COMPLEMENTARY MEASURES IN FEDERAL WATERS

The Board will discuss this during final approval of the Draft Amendment.

4.11 COOPERATION WITH OTHER MANAGEMENT INSTITUTIONS

The Board will cooperate, when necessary, with other management institutions during the implementation of this amendment, including NMFS and the New England, Mid-Atlantic, and South Atlantic Fishery Management Councils.

5.0 COMPLIANCE

The full implementation of the provisions included in this amendment is necessary for the management program to be equitable, efficient, and effective. States are expected to implement these measures faithfully under state laws. ASMFC will continually monitor the effectiveness of state implementation and determine whether states are in compliance with the provisions of this fishery management plan.

The Board sets forth specific elements that the Commission will consider in determining state compliance with this fishery management plan, and the procedures that will govern the evaluation of compliance. Additional details of the procedures are found in the ASMFC Interstate Fishery Management Program Charter (ASMFC 2016).

5.1 MANDATORY COMPLIANCE ELEMENTS FOR STATES

A state will be determined to be out of compliance with the provision of this fishery management plan according to the terms of Section Seven of the ISFMP Charter if:

- Its regulatory and management programs to implement Amendment 7 , or any addendum prepared under adaptive management (*Section 4.7*), have not been approved by the Board; or
- It fails to meet any schedule required by *Section 5.2* or within any addendum prepared under adaptive management (*Section 4.7*); or
- It has failed to implement a change to its program when determined necessary by the Board; or
- It makes a change to its regulations required under *Section 4* or any addendum prepared under adaptive management (*Section 4.7*), without prior approval of the Board.

5.1.1 Regulatory Requirements

To be considered in compliance with this fishery management plan, all state programs must include a regime of restrictions on Atlantic striped bass fisheries consistent with the requirements of *Section 3.1: Commercial Catch and Landings Programs; Section 3.4: Biological Data Collection Programs; Section 4.2 Recreational Fishery Management Measures;* and *Section 4.3: Commercial Fishery Management Measures*. A state may propose an alternative management program under *Section 4.6: Alternative State Management Regimes*, which, if approved by the Board, may be implemented as an alternative regulatory requirement for compliance.

States may begin to implement Amendment 7 after final approval by the Commission. Each state must submit its required Atlantic striped bass regulatory program to the Commission through ASMFC staff for approval by the Board. During the period between submission and Board approval of the state's program, a state may not adopt a less protective management program than contained in this Amendment or contained in current state law or regulation. The following lists the specific compliance criteria that a state/jurisdiction must implement in order to be in compliance with Amendment 7:

- Recreational fishery management measures as specified in *Section 4.2*
- Commercial fishery management measures as specified in *Section 4.3*
- Monitoring requirements as specified in *Section 3.0*, including the Commercial Tagging Program (*Section 3.1.1*), Fishery-Dependent Data Collection (*Section 3.4.1*), and Fishery-Independent Data Collection (*Section 3.4.2*)
- All state programs must include law enforcement capabilities adequate for successful implementation of the compliance measures contained in this Amendment.
- There are no mandatory research requirements at this time; however, research requirements may be added in the future under Adaptive Management, *Section 4.7*.

- There are no mandatory habitat requirements in Amendment 7. See *Section 4.4* for habitat recommendations.

For monitoring programs, states must submit proposals for all intended changes to required monitoring programs, which may affect the quality of the data or the ability of the program to fulfill the needs of the fishery management plan. State proposals for making changes to required monitoring programs will be submitted to the Technical Committee. Proposals must be on a calendar year basis. The Technical Committee will make recommendations to the Management Board concerning whether the proposals are consistent with Amendment 7.

In the event that a state realizes it will not be able to fulfill its fishery independent monitoring requirements, it should immediately notify the Commission in writing. The Commission will work with the state to develop a plan to secure funding or plan an alternative program to satisfy the needs outlined in Amendment 7. If the plan is not implemented 90 days after it has been adopted, the state will be found out of compliance with Amendment 7.

5.2 COMPLIANCE SCHEDULE

States must implement this Amendment according to the following schedule:

Month Day, 202X: Submission of state programs to implement Amendment 7 for approval by the Board. Programs must be implemented upon approval by the Board.

Month Day, 202X: States with approved management programs must implement Amendment 7. States may begin implementing management programs prior to this deadline if approved by the Board.

5.3 COMPLIANCE REPORTS

Each state must submit to the Commission an annual report concerning its Atlantic striped bass fisheries and management program for the previous year, no later than June 15th. A standard compliance report format has been prepared and adopted by the ISFMP Policy Board. States should follow this format in completing the annual compliance report.

The report shall cover:

- The previous calendar year's fishery and management program including mandatory reporting programs (including frequency of reporting and data elements collected), fishery dependent data collection, fishery independent data collection, regulations in effect, harvest and catch information, and *de minimis* requests.
- The planned management program for the current calendar year summarizing regulations that will be in effect and monitoring programs that will be performed, highlighting any changes from the previous year.

5.3.1 Commercial Tagging Program Reports

States and jurisdictions with a commercial striped bass fishery must annually report any changes to the tag program such as tag type, which includes color, text (with the exception of year), and style; the biological metric used; or any other requirements as specified under Section 3.1.1 no later than 60 days prior to the start of the first fishing season in that state or jurisdiction. This information will be compiled and distributed to law enforcement officials to aid in commercial tag enforcement in the striped bass fishery.

5.4 PROCEDURES FOR DETERMINING COMPLIANCE

Detailed procedures regarding compliance determinations are contained in the ISFMP Charter, Section Seven (ASMFC 2016). In brief, all states are responsible for the full and effective implementation and enforcement of fishery management plans in areas subject to their jurisdiction. Written compliance reports as specified in the Amendment must be submitted annually by each state with a declared interest. Compliance with Amendment 7 will be reviewed at least annually; however, the Board, ISFMP Policy Board, or the Commission may request the PRT to conduct a review of state's implementation and compliance with Amendment 7 at any time.

The Board will review the written findings of the PRT within 60 days of receipt of a State's compliance report. Should the Board recommend to the Policy Board that a state be determined out of compliance, a rationale for the recommended noncompliance finding will be addressed in a report. The report will include the required measures of Amendment 7 that the state has not implemented or enforced, a statement of how failure to implement or enforce required measures jeopardizes Atlantic striped bass conservation, and the actions a state must take in order to comply with Amendment 7 requirements.

The ISFMP Policy Board will review any recommendation of noncompliance from the Board within 30 days. If it concurs with the recommendation, it shall recommend to the Commission that a state be found out of compliance.

The Commission shall consider any noncompliance recommendation from the ISFMP Policy Board within 30 days. Any state that is the subject of a recommendation for a noncompliance finding is given an opportunity to present written and/or oral testimony concerning whether it should be found out of compliance. If the Commission agrees with the recommendation of the ISFMP Policy Board, it may determine that a state is not in compliance with Amendment 7, and specify the actions the state must take to come into compliance.

Any state that has been determined to be out of compliance may request that the Commission rescind its noncompliance findings, provided the state has revised its Atlantic striped bass conservation measures.

5.5. ANALYSIS OF THE ENFORCEABILITY OF PROPOSED MEASURES

All state programs must include law enforcement capabilities adequate for successfully implementing that state's Atlantic striped bass regulations. The LEC will monitor the adequacy of a state's enforcement activity.

5.6 RECOMMENDED (NON-MANDATORY) MANAGEMENT MEASURES

The following management measures are recommended for states to fully or partially implement. These measures are not part of the compliance criteria for Amendment 7. Through the Draft Amendment 7 development process, the PDT identified additional potential recommendations for the Board's consideration:

- States are encouraged to increase APAIS sampling above the MRIP baseline to provide more extensive coverage of their state recreational fisheries;
- States should consider complimentary/uniform regulations in shared water bodies if pursuing CE.

5.6.1 Spawning Area Closures

Consideration should be given to the prohibition of fishing on the spawning grounds during the spawning season. In addition to the mandatory spawning closures [if selected in *Section 4.2.2;* delete if not-selected], states are encouraged to maintain existing spawning closures and evaluate the need for additional spawning closures.

5.6.2 Survey of Inland Recreational Fishermen

The states/jurisdictions are encouraged to conduct a survey of inland fishermen to evaluate the landings, catch rate, discards, participation, and number of trips.

5.6.3. Angler Education and Outreach

NOTE: If the option to require outreach is selected in Section 4.2.2 (Option D1), this would be incorporated into that section.

Through the ASMFC, if possible, states are recommended to develop and implement an angler education program. The main tool of the education program will be a website accessible from each state fisheries agency website. When funding is available, states should develop posters and/or brochures for posting and distributing at boat launches, shore-based fishing areas, and for placement on charter and rental boats. State agencies should also coordinate outreach to anglers through influential fishing organizations.

In order to promote the use of circle hooks, states are encouraged to develop public education and outreach campaigns on the benefits of circle hooks when fishing with bait. Angler education on the benefits of using circle hooks and on the effective safe handling of fish caught and released remains a critical component to improve post release survival.

6.0 RESEARCH NEEDS

The following list of research needs have been identified in order to enhance the state of knowledge of the Atlantic striped bass resource. Research recommendations are broken down into several categories: data collection, assessment methodology, life history, habitat, and socioeconomic. Some research needs are further categorized into high and moderate priority levels.

6.1 STOCK ASSESSMENT, DATA COLLECTION, AND LIFE HISTORY RESEARCH NEEDS

The following categorized and prioritized research recommendations were developed by the 2018 Benchmark Stock Assessment Subcommittee and the 66th SARC (NEFSC 2019).

6.1.1 Fishery-Dependent Data

High

- Continue collection of paired scale and otolith samples, particularly from larger striped bass, to facilitate development of otolith-based age-length keys and scale-otolith conversion matrices.
- Develop studies to provide information on gear specific (including recreational fishery) discard morality rates and to determine the magnitude of bycatch mortality.
- Conduct study to directly estimate commercial discards in the Chesapeake Bay.
- Collect sex ratio information on the catch and improve methods for determining population sex ratio for use in estimates of female SSB and biological reference points.

Moderate

- Improve estimates of striped bass harvest removals in coastal areas during wave 1 and in inland waters of all jurisdictions year round.

6.1.2 Fishery-Independent Data

High

- Develop an index of relative abundance from the Hudson River Spawning Stock Biomass survey to better characterize the Delaware Bay/Hudson River stock.
- Improve the design of existing spawning stock surveys for Chesapeake Bay and Delaware Bay.

Moderate

- Develop a refined and cost-efficient, fisheries-independent coastal population index for striped bass stocks.
- Collect sex ratio information from fishery-independent sources to better characterize the population sex ratio.

6.1.3 Stock Assessment Modeling/Quantitative

High

- Develop better estimates of tag reporting rates; for example, through a coastwide tagging study.
- Investigate changes in tag quality and potential impacts on reporting rate.
- Explore methods for combining tag results from programs releasing fish from different areas on different dates.
- Develop field or modeling studies to aid in estimation of natural mortality and other factors affecting the tag return rate.
- Compare M and F estimates from acoustic tagging programs to conventional tagging programs.

Moderate

- Examine methods to estimate temporal variation in natural mortality.

Low

- Evaluate truncated matrices to reduce bias in years with no tag returns and covariate based tagging models to account for potential differences from size or sex or other covariates.

6.1.4 Life History and Biology

High

- Continue in-depth analysis of migrations, stock compositions, sex ratio, etc. using mark-recapture data.
- Continue evaluation of striped bass dietary needs and relation to health condition.
- Continue analysis to determine linkages between the Mycobacteriosis outbreak in Chesapeake Bay and sex ratio of Chesapeake spawning stock, Chesapeake juvenile production, and recruitment success into coastal fisheries.

Moderate

- Examine causes of different tag based survival estimates among programs estimating similar segments of the population.
- Continue to conduct research to determine limiting factors affecting recruitment and possible density implications.
- Conduct study to calculate the emigration rates from producer areas now that population levels are high and conduct multi-year study to determine inter-annual variation in emigration rates.

6.2 HABITAT RESEARCH NEEDS

- See *Section 4.4* for habitat conservation and restoration recommendations, which include reviewing striped bass habitat use and data (e.g., water quality criteria) to inform habitat conservation and restoration.

6.3 SOCIO-ECONOMIC RESEARCH NEEDS

- Conduct research on a coastwide scale to analyze striped bass anglers' preferences and behavior in response to regulatory changes and changes in fishery conditions (e.g., changes in fish availability). This research could inform an economic sub-model component of a bioeconomic model for striped bass (see *Section 1.5.2*).
    - The economic sub-model would use anglers' preferences for different trip attributes to calculate anglers' demand for recreational trips under alternative policy scenarios. In modern applications, this is often achieved by parameterizing recreational demand using survey data from choice experiments in which anglers make trip decisions based on expectations about catch, harvest, and regulatory releases or discards. Choice experiment surveys and revealed preference studies could be used to estimate the effects of changes in regulations in the absence of market data and behavioral observations.
- When the above research is available, work with stock assessment scientists to develop a bioeconomic model for striped bass, which would combine an economic sub-model and biological sub-model to assess feedbacks and long-run impacts of management decisions on anglers and the striped bass resource (see *Section 1.5.*2).
- Conduct research on angler preferences and behavior regarding targeting of substitute species (e.g., which species are targeted with striped bass and what species would anglers target if they were unable to keep striped bass) and how that behavior is influenced by regulations and how preferences differ across regions. This would inform understanding and predictions of changes in effort in response to future regulations and changes in fish availability (e.g., due to climate change).
- Improve understanding of non-consumptive value by region, including value of the catch and release fishery.

7.0 PROTECTED SPECIES

In the fall of 1995, Commission member states, NMFS, and USFWS began discussing ways to improve implementation of the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA) in state waters. Historically, these policies had been only minimally implemented and enforced in state waters (0-3 miles). In November 1995, the Commission, through its ISFMP Policy Board, approved an amendment to its ISFMP Charter (Section Six (b)(2)) requiring protected species/fishery interactions to be discussed in the Commission's fisheries management planning process. As a result, the Commission's fishery management plans describe impacts of state fisheries on MMPA protected and ESA-listed (endangered or threatened) species, collectively termed "protected species". The following section outlines: (1) the federal legislation which guides protection of marine mammals and sea turtles, (2) the protected species with potential fishery interactions; (3) the specific types of fishery interaction; (4) information about the affected protected species; and (5) potential impacts to Atlantic coast state and interstate fisheries.

7.1 MARINE MAMMAL PROTECTION ACT REQUIREMENTS

Since its passage in 1972, and subsequent Amendment in 1994, one of the underlying goals of the MMPA has been to reduce the incidental serious injury and mortality of marine mammals in the course of commercial fishing operations to insignificant levels approaching a zero mortality and zero serious injury rate. Pursuant to the MMPA, NMFS publishes a List of Fisheries (LOF) annually, classifying U.S. commercial fisheries into one of three categories based on the relative frequency of incidental serious injuries and/or mortalities of marine mammals in each fishery (i.e., Category I=frequent; Category II=occasional; Category III=remote likelihood or no known interactions). The Act also requires NMFS to develop and implement a take reduction plan to assist in the recovery of, or prevent the depletion of, each strategic stock that interacts with a Category I or II fishery. A strategic stock is defined as a stock: (1) for which the level of direct human-caused mortality exceeds the potential biological removal (PBR)[26] level; (2) which is declining and is likely to be listed under the Endangered Species Act (ESA) in the foreseeable future; or (3) which is listed as a threatened or endangered species under the ESA or as a depleted species under the MMPA.

Under 1994 mandates, the MMPA also requires fishermen in Category I and II fisheries to register under the Marine Mammal Authorization Program (MMAP). The purpose of this is to provide an exception for commercial fishermen from the general taking prohibitions of the MMPA. All fishermen, regardless of the category of fishery in which they participate, must report all incidental injuries and mortalities to a marine mammal caused by commercial fishing operations within 48 hours.

Section 101(a)(5)(E) of the MMPA allows for authorization of the incidental take of ESA-listed marine mammals in the course of commercial fishing operations if it is determined that: (1) incidental mortality and serious injury will have a negligible impact on the affected species or stock; (2) a recovery plan has been developed or is being developed for such species or stock under the ESA; and (3) where required under MMPA Section 118, a monitoring program has been established, vessels engaged in such fisheries are registered, and a take reduction plan has been developed or is being developed for such species or stock. MMPA Section 101(a)(5)(E) permits are not required for Category III fisheries, but any serious injury or mortality of a marine mammal must be reported.

7.2 ENDANGERED SPECIES ACT REQUIREMENTS

The taking of endangered or threatened species including sea turtles, marine mammals, and fish, is prohibited and considered unlawful under Section 9(a)(1) of the ESA. In addition, NMFS or the USFWS may determine Section 4(d) protective regulations to be necessary and advisable

[26] PBR is the number of human-caused deaths per year each stock can withstand and still reach an optimum population level. This is calculated by multiplying the minimum population estimate by the stock's net productivity rate and a recovery factor ranging from 0.1 for endangered species to 1.0 for healthy stocks.

to provide for the conservation of threatened species. There are several mechanisms established in the ESA which allow for exceptions to the prohibited take of protected species listed under the ESA. Section 10(a)(1)(A) of the ESA authorizes NMFS to allow the taking of listed species through the issuance of research permits, which allow ESA species to be taken for scientific purposes or to enhance the propagation and survival of the species. Section 10(a)(1)(B) authorizes NMFS to permit, under prescribed terms and conditions, any taking otherwise prohibited by Section 9(a)(1)(B) of the ESA if the taking is incidental to, and not the purpose of, carrying out an otherwise lawful activity. In recent years, some Atlantic state fisheries have obtained section 10(a)(1)(B) permits for state fisheries.

Section 7(a)(2) requires federal agencies to consult with NMFS to ensure that any action that is authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat of such species. If, following completion of the consultation, an action is found to jeopardize the continued existence of any listed species or cause adverse modification to critical habitat of such species, reasonable and prudent alternatives need to be identified so that jeopardy or adverse modification to the species does not occur. Section (7)(o) provides the actual exemption from the take prohibitions established in Section 9(a)(1), which includes Incidental Take Statements that are provided at the end of consultation via the ESA Section 7 Biological Opinions.

7.3 PROTECTED SPECIES WITH POTENTIAL FISHERY INTERACTIONS

Commercial striped bass fisheries operate in the state waters (0-3 miles) of Massachusetts, Rhode Island, New York, Delaware, Maryland, the Potomac River Fisheries Commission, Maryland, Virginia, and North Carolina.[27] The Chesapeake Bay typically accounts for roughly 60 percent of striped bass commercial landings by weight each year. The primary gear types for the striped bass commercial fishery are gill nets (roughly 50 percent of commercial landings by weight each year), hook and line (typically 20-30 percent of commercial landings by weight each year), and pound nets/other fixed gears (typically 10-20 percent of commercial landings by weight each year). Haul seines and trawls are also used in the commercial fishery to a lesser extent (combined less than 5 percent of commercial landings by weight each year). The recreational sector operates in state waters across the entire management unit (0-3 miles from Maine through North Carolina) and uses hook and line almost exclusively.

A number of protected species occur within the striped bass management unit for Atlantic striped bass. Ten are classified as endangered or threatened under the ESA; the remainder are protected under provisions of the MMPA. The species found in coastal Northwest Atlantic waters are listed below.

[27] North Carolina has reported zero offshore commercial harvest since 2013.

Endangered

North Atlantic Right whale	(*Eubalaena glacialis*)
Fin whale	(*Balaenoptera physalus*)
Leatherback sea turtle	(*Dermochelys coriacea*)
Kemp's Ridley sea turtle	(*Lepidochelys kempii*)
Shortnose sturgeon	(*Acipenser brevirostrum*)
Atlantic sturgeon (New York Bight, Chesapeake Bay, Carolina, and South Atlantic Distinct Population Segments (DPS))	(*Acipenser oxyrinchus oxyrinchus*)

Threatened

Loggerhead sea turtle (NW Atlantic Ocean DPS)	*(Caretta caretta)*
Green sea turtle (North Atlantic DPS)	*(Chelonia mydas)*
Giant Manta Ray	*(Manta birostris)*
Atlantic Sturgeon (Gulf of Maine DPS)	*(Acipenser oxyrinchus oxyrinchus)*

MMPA

Includes all marine mammals above in addition to:

Minke whale	*(Balaenoptera acutorostrata)*
Humpback whale	*(Megaptera novaeangliae)*
Bottlenose dolphin[28]	*(Tursiops truncatus)*
Atlantic-white sided dolphin	*(Lagenorhynchus acutus)*
Short Beaked Common dolphin	*(Delphinus delphis)*
Harbor seal	*(Phoca vitulina)*
Gray seal	*(Halichoerus grypus)*
Harp seal	(*Phoca groenlandica*)
Harbor porpoise	(*Phocoena phocoena*)

In the Northwest Atlantic waters, protected species utilize marine habitats for feeding, reproduction, nursery areas, and migratory corridors. Some species occupy the area year round while others use the region only seasonally or move intermittently nearshore, inshore, and offshore. Interactions may occur whenever fishing gear and protected species overlap spatially and temporally.

As the primary concern for both MMPA protected and ESA listed species is the potential for the fishery to interact (e.g., bycatch, entanglement) with these species it is necessary to consider species occurrence in the affected environment of the fishery and how the fishery will overlap in time and space with this occurrence; and observed records of protected species interaction with particular fishing gear types, to understand the potential risk of an interaction.

[28] The following bottlenose dolphin stocks occur within the striped bass management unit: Western North Atlantic Northern Migratory Coastal; Western North Atlantic Southern Migratory Coastal; Northern North Carolina Estuarine System; Southern North Carolina Estuarine System.

7.3.1 Marine Mammals

Large whales, small cetaceans (e.g., bottlenose dolphins), and pinniped (e.g., harbor seals) species co-occur with the Atlantic striped bass fishery.

Large whales

Large whales, including Humpback, North Atlantic right, fin, and minke whales, occur in the Northwest Atlantic. Generally speaking, large whales follow an annual pattern of migration between low latitude (south of 35°N) wintering/calving grounds and high latitude spring/summer/fall foraging grounds (primarily north of 41°N). This is a simplification of whale movements, particularly as it relates to winter movements. It is unknown if all individuals of a population migrate to low latitudes in the winter, although increasing evidence suggests that for some species, some portion of the population remains in higher latitudes throughout the winter (Clapham et al. 1993; Davis et at. 2017; Davis et al. 2020; Hayes et al. 2020; Swingle et al. 1993; Vu et al. 2012). For additional information on the biology, status, and range wide distribution of humpback, North Atlantic right, fin, sei, and minke whales, refer to the marine mammal SARs provided at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region.

Small Cetaceans and Pinnipeds

Small cetaceans can be found throughout the year in the Northwest Atlantic Ocean (Maine to Florida), including in harbors, bays, gulfs, and estuaries; however, within this range, there are seasonal shifts in species distribution and abundance. Pinnipeds are primarily found throughout the year or seasonally from New Jersey to Maine; however, increasing evidence indicates that some species (e.g., harbor seals) may be extending their range seasonally into waters as far south as Cape Hatteras, North Carolina (35°N).

For additional information on the biology and range wide distribution of each species of small cetacean and pinniped, as well as information on other marine mammals that occur on the Atlantic coast, refer to the marine mammal SARs provided at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region

7.3.1.1 Gear Interactions with Marine Mammals

Marine mammal interactions have been documented in the primary fisheries that target striped bass, including the pound net and gillnet fisheries as well as trawl, haul seine, and hook and line. The following sections are not a comprehensive review of all fishing gear types known to interact with a given species and the bycatch reports included below do not represent a complete list. It should be noted that without an observer program for many of these fisheries, actual numbers of interactions associated with the striped bass fishery are difficult to obtain.

Gillnets

The mid-Atlantic gillnet fishery is listed as a Category I fishery in the 2021 LOF (86 FR 3028, January 14, 2021). The fishery was originally listed as a Category II fishery but in 2003, it was elevated to a Category I fishery after stranding and observer data documented the incidental mortality and serious injury of bottlenose dolphins (68 FR 41725, July 15, 2003). Other species with documented interactions include the common dolphin, harbor seal, gray seal, and hooded seal; however, since gillnet fisheries target many species, not all incidents may have occurred while harvesting striped bass. Between 1995 and 2018, observer coverage has ranged from 1% to 9%.
The Chesapeake Bay inshore gillnet and the North Carolina inshore gillnet are all listed as Category II fisheries in the 2021 LOF (86 FR 3028, January 14, 2021). The primary species reported interacting with these gears is the bottlenose dolphin. Both the Chesapeake Bay inshore gillnet and the North Carolina inshore gillnet fisheries were elevated from a Category III fishery to a Category II fishery in the 2006 and 2001 LOFs, respectively (66 FR 42780, August 15, 2001; 71 FR 48802, August 22, 2006).

The Delaware River inshore gillnet, the Long Island Sound inshore gillnet, and the Rhode Island/Southern Massachusetts/New York Bight inshore gillnet fisheries are listed as Category III fisheries in the 2021 LOF (86 FR 3028, January 14, 2021). There have been no documented interactions with marine mammals in the past five years of data.

Hook and Line
Large whales have been documented entangled with hook and line gear or monofilament line (Greater Atlantic Region Marine Animal Incident Database, unpublished data; Marine Mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region). In the most recent (2008-2017) mortality and serious injury determinations for baleen whales, the majority of cases identified with confirmed hook and line or monofilament entanglement did not result in the serious injury or mortality to the whale (84.8 % observed/reported whales had a serious injury value of 0; 15.2 % had a serious injury value of 0.75; none of the cases resulted in mortality; Cole and Henry 2013; Henry et al. 2017; Henry et al. 2020). In fact, 75.8 % of the whales observed or reported with a hook/line or monofilament entanglement were resighted gear free and healthy; confirmation of the health of the other remaining whales remain unknown as no resightings had been made over the timeframe of the assessment (Cole and Henry 2013; Henry et al. 2017; Henry et al. 2020). Based on this information, while large whale interactions with hook and line gear are possible, there is a low probability that an interaction will result in serious injury or mortality to any large whale species. Therefore, relative to other gear types, such as fixed gear, hook and line gear represents a low source serious injury or mortality to any large whale (Henry et al. 2020).

Based on the most recent 10 years of data provided in the marine mammal SARs (i.e., 2008-2017) for small cetaceans and pinnipeds that occur within the striped bass management unit, only bottlenose dolphin stocks have been identified (primarily through stranding records/data) as entangled in hook and line gear (https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region). In some cases, these entanglements have resulted in the serious injury or mortality to the animal. Specifically,

reviewing stranding data provided in marine mammal SARs from 2008-2017, estimated mean annual mortality for each bottlenose stock due to interactions with hook and line gear was approximately one animal (Palmer 2017; https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region). Based on this, although interactions with hook and line gear are possible, relative to other gear types, such as trawl gear, hook and line gear represents a low source serious injury or mortality to any bottlenose dolphin stock. For other species of small cetaceans or pinnipeds, hook and line gear is not expected to be a source of serious injury or mortality.

Pound Nets

The Virginia pound net fishery is listed as a Category II fishery in the 2021 LOF due to documented interactions with bottlenose dolphins (86 FR 3028, January 14, 2021). During 2014–2018, there were no documented mortalities or serious injuries to bottlenose dolphins involving pound net gear in Virginia. There is no formal observer coverage for the Virginia pound net fishery but there has been sporadic monitoring by the Northeast Fishery Observer Program. All other Atlantic coast pound net fisheries are listed as a Category III fishery.

NOAA Fisheries issued a final rule in 2015 amending the Bottlenose Dolphin Take Reduction Plan and its implementing regulations under the Marine Mammal Protection Act (MMPA) requiring gear restrictions for VA pound nets in estuarine and coastal state waters of Virginia to reduce bycatch (80 FR 6925, February 9, 2015). NOAA Fisheries also amended regulations and definitions for Virginia pound nets under the Endangered Species Act (ESA) for sea turtle conservation to be consistent with this final rule. More information on this rule is available here: https://www.fisheries.noaa.gov/action/amendment-virginia-pound-net-regulations.

Fyke Net and Floating Fish Traps

The Rhode Island Floating fish trap and the Northeast/Mid-Atlantic fyke net fisheries are listed as a Category III fishery in the 2021 LOF (86 FR 3028, January 14, 2021). There are no documented interactions between marine mammals in the Northeast/Mid-Atlantic fyke net fishery nor the floating fish trap fishery.

Bottom Trawls

The Mid-Atlantic bottom trawl fishery is listed as a Category II fishery in the 2021 LOF (86 FR 3028, January 14, 2021). In 2005, Mid-Atlantic bottom trawl fishery was elevated to Category II based on mortality and injury of common dolphins and pilot whales (later removed from the list of species killed or injured by this fishery). This fishery continues to be listed as a Category II fishery due to interactions with bottlenose dolphins, common dolphins, and gray seals. Interactions with other species include the harbor seal, Risso's dolphin, and white-sided dolphin.[29]

[29] For additional information on small cetacean and pinniped interactions, see: Chavez-Rosales et al. 2017; Hatch and Orphanides 2014, 2015, 2016, 2019; Josephson et al. 2017; Josephson et al. 2019; Lyssikatos 2015; Lyssikatos

With the exception of minke whales, there have been no observed interactions with large whales and bottom trawl gear.[30] In 2008, several minke whales were observed dead in bottom trawl gear attributed to the northeast bottom trawl fishery; estimated annual mortality attributed to this fishery in 2008 was 7.8 minke whales (Waring et al. 2015). Since 2008, serious injury and mortality records for minke whales in U.S. waters have shown zero interactions with bottom trawl (northeast or Mid-Atlantic) gear.[31] Based on this information, large whale interactions with bottom trawl gear are expected to be rare to nonexistent.

Haul/Beach Seine

The Mid-Atlantic haul/beach seine fishery is listed as a Category II fishery in the 2021 LOF due to interactions with coastal bottlenose dolphin (86 FR 3028, January 14, 2021). NMFS has recorded one observed take of a bottlenose dolphin in this fishery in 1998 (Waring and Quintal 2000). During 2014–2018, one serious injury of a common bottlenose dolphin occurred associated with the mid-Atlantic haul/beach seine fishery. During 2014, a common bottlenose dolphin was found within a haul seine net in Virginia and released alive seriously injured (Maze-Foley and Garrison 2020). Harbor porpoise was removed from the list of species killed or injured in the Mid-Atlantic haul/beach seine fishery due to no other interactions between 1999 and 2003. The fishery was observed from 1998-2001 but there has been limited observer coverage since 2001.

7.3.2 Sea Turtles

All sea turtles that occur in U.S. waters are listed as either endangered or threatened under the ESA. Four sea turtle species likely to overlap with the striped bass fishery are loggerhead (*Caretta caretta*), Kemp's Ridley (*Lepidochelys kempi*), green (*Chelonia mydas*), and leatherback (*Dermochelys coriacea*) sea turtles.

The Atlantic seaboard provides important developmental habitat for post-pelagic juveniles, as well as foraging and nesting habitat for adult sea turtles. The distribution and abundance of sea

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et al. 2020; Orphanides 2020; Read *et al*. 2006; Waring et al. 2015b; Marine Mammal SARS: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; MMPA LOF at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries.

[30] Refer to Greater Atlantic Region Marine Animal Incident Database (unpublished data); Marine Mammal SARs: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-stock-assessment-reports-region; NEFSC observer/sea sampling database, unpublished data ; MMPA LOF: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries; NMFS NEFSC reference documents (marine mammal serious injury and mortality reports): https://apps-nefsc.fisheries.noaa.gov/rcb/publications/center-reference-documents.html

[31] Refer to: Greater Atlantic Region Marine Animal Incident Database (unpublished data); Waring et al. 2016; Hayes et al. 2017; Hayes et al. 2018; Hayes et al. 2019; Hayes et al. 2020; Cole and Henry 2013; and, Henry et al. 2014, 2015, 2016, 2017, 2019, 2020; MMPA LOF: https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine-mammal-protection-act-list-fisheries.

turtles along the Atlantic coast is related to geographic location and seasonal variations in water temperatures. In U.S. Northwest Atlantic waters, hard-shelled turtles commonly occur throughout the continental shelf from Florida to Cape Cod, MA, although their presence varies with the seasons due to changes in water temperature. As coastal water temperatures warm in the spring, loggerheads begin to migrate to inshore waters of the southeast United States and also move up the Atlantic Coast (Braun-McNeill & Epperly 2004; Epperly et al. 1995a,b,c; Griffin et al. 2013; Morreale & Standora 2005), occurring in Virginia foraging areas as early as late April and on the most northern foraging grounds in the GOM in June (Shoop & Kenney 1992). The trend is reversed in the fall as water temperatures cool. The large majority leave the Gulf of Maine by September, but some remain in Mid-Atlantic and Northeast areas until late fall (i.e., November). By December, sea turtles have migrated south to waters offshore of North Carolina, particularly south of Cape Hatteras, and further south, although it should be noted that hard-shelled sea turtles can occur year-round in waters off Cape Hatteras and south (Epperly et al. 1995b; Griffin et al. 2013; Hawkes et al. 2011; Shoop & Kenney 1992).

Juvenile Kemp's ridleys sea turtles use northeastern and mid-Atlantic waters of the U.S. Atlantic coastline as primary developmental habitat, with shallow coastal embayments serving as important foraging grounds during the summer months. Juvenile ridleys migrate south as water temperatures cool, and are predominantly found in shallow coastal embayments along the Gulf Coast during the fall and winter months. Kemp's ridleys can be found from New England to Florida, and are the second most abundant sea turtle in Virginia and Maryland waters (Keinath et al. 1987; Musick and Limpus, 1997). In the Chesapeake Bay, ridleys frequently forage in shallow embayments, particularly in areas supporting submerged aquatic vegetation (Lutcavage and Musick, 1985; Bellmund et al., 1987; Keinath et al,. 1987; Musick and Limpus, 1997). These turtles primarily feed on crabs, but also consume mollusks, shrimp, and fish (Bjorndal, 1997).

The leatherback is the largest living turtle and its range is farther than any other sea turtle species (NMFS, 2013). Leatherback turtles are often found in association with jellyfish, with the species primarily feeding on Cnidarians (*medusae, siphonophores*) and tunicates (*salps, pyrosomas*). While these turtles are predominantly found in the open ocean, they do occur in coastal water bodies such as Cape Cod Bay and Narragansett Bay, particularly the fall. The most significant nesting in the U.S. occurs in southeast Florida (NMFS, 2013). Leatherbacks are known to use coastal waters of the U.S. continental shelf and to have a greater tolerance for colder water than hard-shelled sea turtles (James *et al.* 2005; Eckert *et al.* 2006; Murphy *et al.* 2006; NMFS and USFWS 2013b; Dodge *et al.* 2014). Leatherback sea turtles engage in routine migrations between northern temperate and tropical waters; they are found in more northern waters (i.e., Gulf of Maine) later in the year (i.e., similar time frame as hard-shelled sea turtles), with most leaving the Northwest Atlantic shelves by mid-November (NMFS and USFWS 1992; James *et al.* 2005; James *et al*. 2006; Dodge *et al.* 2014).

More information about sea turtles can be found here: https://www.fisheries.noaa.gov/sea-turtles.

7.3.2.1 Potential Impacts of Striped Bass Fishery on Sea Turtles

The following sections are not a comprehensive review of all fishing gear types known to interact with a given species and the bycatch reports included below do not represent a complete list.

Gillnet

An observer program for protected species has not been established for the striped bass fishery. However, under the ESA Annual Determination to Implement Sea Turtle Observer Requirement (80 FR 14319, April 18, 2015), one fishery that targets striped bass is included, the Chesapeake Bay Inshore Gillnet Fishery.

Hook and Line

Interactions between ESA listed species of sea turtles and hook and line gear have been documented, particularly in nearshore waters of the Mid-Atlantic (e.g., Greater Atlantic Region Sea Turtle and Disentanglement Network, unpublished data; NMFS Sea Turtle Stranding and Salvage Network, unpublished data; Palmer 2017). Interactions with hook and line gear have resulted in sea turtle injury and mortality and therefore, poses an interaction risk to these species. However, the extent to which these interactions are impacting sea turtle populations is still under investigation, and therefore, no conclusions can currently be made on the impact of hook and line gear on the continued survival of sea turtle populations.

Pound Nets

Populations of loggerhead, Kemp's ridley, and leatherback sea turtles are at risk in areas where pound net fishing is abundant, such as the Chesapeake Bay and surrounding waters. NOAA Fisheries issued a final rule in 2015 amending the Bottlenose Dolphin Take Reduction Plan and its implementing regulations under the MMPA requiring gear restrictions for VA pound nets in estuarine and coastal state waters of Virginia to reduce bycatch (80 FR 6925, February 9, 2015). NOAA Fisheries also amended regulations and definitions for Virginia pound nets under the ESA for sea turtle conservation to be consistent with this final rule. Pound net regulations were enacted to protect both sea turtles and bottlenose dolphins. More information on this rule is available here: https://www.fisheries.noaa.gov/action/amendment-virginia-pound-net-regulations.

Bottom Trawl

Bottom trawl gear poses an injury and mortality risk to sea turtles (Sasso and Epperly 2006; NMFS Observer Program, unpublished data). Since 1989, the date of our earliest observer records for federally managed fisheries, sea turtle interactions with trawl gear have been observed in the Gulf of Maine, Georges Bank, and/or the Mid-Atlantic; however, most of the observed interactions have been observed south of the Gulf of Maine (Murray 2008; Murray 2015b; Murray 2020; NMFS Observer Program, unpublished data; Warden 2011 a, b). Murray (2020) provided information on sea turtle interaction rates from 2014-2018 and estimated 571 loggerhead, 46 Kemp's ridley, 20 leatherback, and 16 green sea turtle interactions were estimated to have occurred in bottom trawl gear in the Mid-Atlantic region over the five-year period. On Georges Bank, 12 loggerheads, and 6 leatherback interactions. An estimated 272

loggerhead, 23 Kemp's ridley, 13 leatherback, and 8 green sea turtle interactions resulted in mortality over this period (Murray 2020).

7.3.3 Atlantic Sturgeon

Since 1998, there has been a moratorium on the harvest of Atlantic Sturgeon in both state and federal waters; however, the population has continued to decline and, in 2012, Atlantic sturgeon became listed under the ESA. The listing identifies five distinct population segments (DPS), which include the Gulf of Maine, the New York Bight, the Chesapeake Bay, Carolina, and the South Atlantic (77 FR 5914 and 77 FR 5880, February 6, 2012). All DPSs are listed as endangered except for the Gulf of Maine population, which is listed as threatened. Primary threats to the species include historic overfishing, the bycatch of sturgeon in other fisheries, habitat destruction from dredging, dams, and development, and vessel strikes (77 FR 5914; 77 FR 5880). In April 2017, NOAA Fisheries published a final rule (82 FR 39160) to designate Atlantic sturgeon critical habitat (i.e., specific areas that are considered essential to the conservation of the species) in each of the DPSs.

The marine range of U.S. Atlantic sturgeon extends from Labrador, Canada, to Cape Canaveral, Florida. Based on fishery-independent and dependent data, as well as data collected from tracking and tagging studies, in the marine environment, Atlantic sturgeon appear to primarily occur inshore of the 50 meter depth contour (Stein et al. 2004 a,b; Erickson et al. 2011; Dunton et al. 2010); however, Atlantic sturgeon are not restricted to these depths, as excursions into deeper continental shelf waters have been documented (Timoshkin 1968; Collins and Smith 1997; Stein et al. 2004a,b; Dunton et al. 2010; Erickson et al. 2011). Data from fishery-independent surveys and tagging and tracking studies also indicate that Atlantic sturgeon may undertake seasonal movements along the coast (Dunton et al. 2010; Erickson et al. 2011; Wipplehauser 2012); however, there is no evidence to date that all Atlantic sturgeon make these seasonal movements and therefore, may be present throughout the marine environment throughout the year.

For additional information on the biology, status, and range wide distribution of each distinct population segment (DPS) of Atlantic sturgeon please refer to 77 FR 5880 and 77 FR 5914, as well as the Atlantic Sturgeon Status Review Team's (ASSRT) 2007 status review of Atlantic sturgeon (ASSRT 2007) and the Atlantic States Marine Fisheries Commission 2017 Atlantic Sturgeon Benchmark Stock Assessment and Peer Review Report (ASMFC 2017).

7.3.3.1 Potential Impacts of Striped Bass Fishery on Atlantic Sturgeon

The following sections are not a comprehensive review of all fishing gear types known to interact with a given species and the bycatch reports included below do not represent a complete list.

<u>Bottom Trawl and Gillnet</u>

Since 1989, Atlantic sturgeon interactions (i.e., bycatch) with sink gillnet and bottom trawl gear have frequently been observed in the Greater Atlantic Region, with most sturgeon observed

captured falling within the 100 to 200cm total length range; however, both larger and small individuals have been observed (ASMFC 2007; ASMFC 2017; Miller and Shepard 2011; NEFSC observer/sea sampling database, unpublished data; Stein et al. 2004). For sink gillnets, higher levels of Atlantic sturgeon bycatch have been associated with depths of less than 40 meters, mesh sizes of greater than 10 inches, and the months of April and May (ASMFC 2007). Hager et al. (2021) found that subadult Atlantic sturgeon are particularly susceptible to interactions with striped bass sink gillnet gear in the James River, VA.

For otter trawl fisheries, the highest incidence of Atlantic sturgeon bycatch have been associated with depths less than 30 meters (ASMFC 2007). More recently, over all gears and observer programs that have encountered Atlantic sturgeon, the distribution of haul depths on observed hauls that caught Atlantic sturgeon was significantly different from those that did not encounter Atlantic surgeon, with Atlantic sturgeon encountered primarily at depths less than 20 meters (ASMFC 2017).

The ASMFC (2017) Atlantic sturgeon benchmark stock assessment represents the most accurate predictor of annual Atlantic sturgeon interactions in fishing gear (e.g., otter trawl, gillnet). The stock assessment analyzes fishery observer and VTR data to estimate Atlantic sturgeon interactions in fishing gear in the Mid-Atlantic and New England regions from 2000-2015, the timeframe which included the most recent, complete data at the time of the report. The total bycatch of Atlantic sturgeon from bottom otter trawls ranged between 624-1,518 fish over the 2000-2015 time series, while the total bycatch of Atlantic sturgeon from gillnets ranged from 253-2,715 fish. Focusing on the most recent five-year period of data provided in the stock assessment report[32], the estimated average annual bycatch during 2011-2015 of Atlantic sturgeon in bottom otter trawl gear is 777.4 individuals and in gillnet gear is 627.6 individuals.

Hook and Line

Interactions between ESA-listed species of Atlantic sturgeon and hook and line gear have been documented, particularly in nearshore waters (ASMFC 2017). Interactions with hook and line gear have resulted in Atlantic sturgeon injury and mortality and therefore, poses an interaction risk to these species. However, the extent to which these interactions are impacting Atlantic sturgeon DPSs is still under investigation and therefore, no conclusions can currently be made on the impact of hook and line gear on the continued survival of Atlantic sturgeon DPSs (NMFS 2011b; ASMFC 2017).

7.3.4 Shortnose Sturgeon

Shortnose sturgeon occur in estuaries large coastal rivers on the Atlantic coast from Canada to Florida, including the Chesapeake Bay and its tributaries. Shortnose sturgeon spend most of

[32] The period of 2011-2015 was chosen as it is the period within the stock assessment that most accurately resembles the current trawl fisheries in the region.

their life in their natal river system and estuaries and tend to spend little time in ocean waters (NMFS 1998). Adults generally migrate upriver in spring to spawn and move back downstream after spawning to higher salinity habitats for foraging (SSSRT 2010). Shortnose sturgeon have been listed as endangered under the ESA since 1967 and the 1998 recovery plan identified 19 DPSs across 25 river systems.

7.3.4.1 Potential Impacts of Striped Bass Fisheries on Shortnose Sturgeon

Bycatch of shortnose sturgeon in fisheries targeting other species has been documented throughout its range (SSSRT 2010). Bycatch of shortnose sturgeon primarily occurs in gillnet fisheries, but has also occurred in other gear types including pound nets, fyke nets, and hook and lines. Adult shortnose sturgeon are thought to be especially vulnerable to fishing gears targeting anadromous species (such as shad, striped bass, alewives and herring) during times of extensive migration, particularly their spawning migration (SSSRT 2010; Litwiler 2001).

7.3.5 Giant Manta Ray

While there is considerable uncertainty regarding the species' current abundance throughout its range, the best available information indicates that the species has experienced population declines of potentially significant magnitude within areas of the Indo-Pacific and eastern Pacific portions of its range (Miller and Klimovich 2017). While it's assume that declining populations within the Indo-Pacific and eastern Pacific will likely translate to overall declines in the species throughout its entire range, there is very little information on the abundance, and thus, population trends in the Atlantic portion of its range (Miller and Klimovich 2017).

Based on the giant manta ray's distribution, the species may occur in coastal, nearshore, and pelagic waters off the U.S. east coast (Miller and Klimovich 2017). Along the U.S. East Coast, giant manta rays are usually found in water temperatures between 19 and 22 degrees Celsius (Miller and Klimovich 2017) and have been observed as far north as New Jersey. Given that the species is rarely identified in the fisheries data in the Atlantic, it may be assumed that populations within the Atlantic are small and sparsely distributed (Miller and Klimovich 2017).

7.3.5.1 Potential Impacts of Striped Bass Fishery on Giant Manta Rays

The following sections are not a comprehensive review of all fishing gear types known to interact with a given species and the bycatch reports included below do not represent a complete list.

<u>Bottom Trawl and Gillnet Gear</u>

Giant manta rays are potentially susceptible to capture by gillnet and bottom trawl gear based on records of their capture in fisheries using this gear types (NEFSC observer/sea sampling database, unpublished data). Review of the most recent 10 years of NEFOP data showed that between 2010-2019, two (unidentified) Giant Manta Rays were observed in bottom trawl gear and two were observed in gillnet gear (NMFS NEFSC observer/sea sampling database, unpublished data). Additionally, all of the giant manta ray interactions in gillnet or trawl gear recorded in the NEFOP database (13 between 2001 and 2019) indicate the animals were

encountered alive and released alive. However, details about specific conditions such as injuries, damage, time out of water, how the animal was moved or released, or behavior on release is not always recorded. While there is currently no information on post-release survival, NMFS Southeast Gillnet Observer Program observed a range of 0 to 16 giant manta rays captured per year between 1998 and 2015 and estimated that approximately 89% survived the interaction and release (see NMFS reports available at: http://www.sefsc.noaa.gov/labs/panama/ob/gillnet.htm).

Hook and Line

The most recent 10 years of data on observed or documented interactions between giant manta rays and fishing gear, there have been no observed/documented interactions between giant manta rays and hook and line gear (NEFSC observer/sea sampling database, unpublished data). Based on this information, hook and line gear is not expected to pose an interaction risk to giant manta rays and therefore, is not expected to be source of injury or mortality to this species

7.3.6 Seabirds

Like marine mammals, seabirds are vulnerable to entanglement in commercial fishing gear. Under the Migratory Bird Treaty Act, it is unlawful "by any means or in any manner, to pursue, hunt, take, capture, [or] kill" any migratory birds except as permitted by regulation (16 U.S.C. 703). Given that an interaction has not been quantified in the Atlantic striped bass fishery, impacts to seabirds are not considered to be significant. Endangered and threatened bird species, such as the piping plover, are unlikely to be impacted by the gear types employed in the striped bass fishery. Other human activities such as coastal development, habitat degradation and destruction, and the presence of organochlorine contaminants are considered to be the major threats to some seabird populations.

7.4 POTENTIAL IMPACTS TO ATLANTIC COASTAL STATE AND INTERSTATE FISHERIES

There are several take reduction teams, whose management actions have potential impacts to coastal striped bass fisheries.

The Mid-Atlantic coastal gillnet fishery is one of two fisheries regulated by the Harbor Porpoise Take Reduction Plan (50 CFR 229.33 and 229.34). Amongst other measures, the plan uses time area closures in combination with pingers in Northeast waters, and time area closures along with gear modifications for both small and large mesh gillnets in mid-Atlantic waters. Although the plan predominately impacts the dogfish and monkfish fisheries due to higher porpoise bycatch rates, other gillnet fisheries are also affected.

The Atlantic Large Whale Take Reduction Plan (50 CFR 229.32) (ALWTRP) addresses the incidental bycatch of large baleen whales, primarily the North Atlantic right whale and the humpback whale, in several fisheries including Mid-Atlantic coastal gillnet fishery. Amongst other measures, the plan closes right whale critical habitat areas to specific types of fishing gear

during specific seasons, and modifies fishing gear and practices. The Atlantic Large Whale Take Reduction Team continues to identify ways to reduce possible interactions between large whales and commercial gear. In 2014 and 2015, the ALWTRP was modified to reduce the number of vertical lines associated with trap/pot fisheries and required expanded gear markings for gillnets and traps in Jeffrey's Ledge and Jordan Basin (79 FR 35686, June 27, 2014; 80 FR 30367, May 28, 2015).

The Bottlenose Dolphin Take Reduction Team first convened in 2001 to discuss incidental catch of coastal bottlenose dolphins in Category I and II fisheries. In 2006, a Bottlenose Dolphin Take Reduction Plan was established, which created gear regulations for the mid-Atlantic coastal gillnet fishery, the Virginia pound net fishery, the mid-Atlantic beach seine fishery, and the North Carolina inshore gillnet fishery, among others. Specifically, the plan established mesh sizes for the gill net fisheries and prohibited night fishing for some regions and gear types (71 FR 24776, April 26, 2006).

Based on a consensus recommendation from the Bottlenose Dolphin Take Reduction Team, NOAA Fisheries issued a final rule in 2015 amending the Bottlenose Dolphin Take Reduction Plan and its implementing regulations under the Marine Mammal Protection Act (MMPA) to require the year-round use of modified pound net leaders for offshore Virginia pound nets in specified waters of the lower mainstem Chesapeake Bay and coastal state waters (80 FR 6925, February 9, 2015). The rule also finalized Virginia pound net-related definitions, gear prohibitions, and non-regulatory measures. NOAA Fisheries also amended regulations and definitions for Virginia pound nets under the Endangered Species Act (ESA) for sea turtle conservation to be consistent with this final rule. Pound net regulations were enacted to protect both sea turtles and bottlenose dolphins. More information on this rule is available here: https://www.fisheries.noaa.gov/action/amendment-virginia-pound-net-regulations.

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9.0 TABLES

Note: Tables 1-7 are in-text.

Table 8. Base quota, 2020 quota, and 2020 harvest by state in pounds. Source: 2021 state compliance reports. 2020 quota was based on Addendum VI and approved conservation equivalency programs.

State	Base Quota	2020 Quota^	2020 Harvest
Ocean			
Maine*	154	154	-
New Hampshire*	3,537	3,537	-
Massachusetts	713,247	735,240	386,924
Rhode Island	148,889	148,889	115,891
Connecticut*	14,607	14,607	-
New York	652,552	640,718	473,461
New Jersey**	197,877	215,912	-
Delaware	118,970	142,474	137,986
Maryland	74,396	89,094	83,594
Virginia	113,685	125,034	77,239
North Carolina	295,495	295,495	0
Ocean Total	**2,333,409**	**2,411,154**	**1,275,095**
Chesapeake Bay			
Maryland	**2,588,603**	1,442,120	1,273,757
Virginia		983,393	611,745
PRFC		572,861	400,319
Bay Total		**2,998,374**	**2,285,821**

* Commercial harvest/sale prohibited, with no re-allocation of quota.
** Commercial harvest/sale prohibited, with re-allocation of quota to the recreational fishery.
^ 2020 quota changed through conservation equivalency by either changing size limit with equivalent 18% quota reduction (MA, NY), or by taking a greater than 18% reduction in recreational removals to offset a less than 18% commercial quota reduction (NJ, DE, MD, PRFC, VA).
Note: Maryland's Chesapeake Bay quota for 2020 was adjusted to account for the overage in 2019.

Table 9. Summary of Atlantic striped bass commercial regulations in 2020. Source: 2021 State Compliance Reports. Minimum sizes and slot size limits are in total length (TL). *Commercial quota reallocated to recreational bonus fish program.

STATE	SIZE LIMITS (TL) and TRIP LIMITS	SEASONAL QUOTA	OPEN SEASON
ME	Commercial fishing prohibited		
NH	Commercial fishing prohibited		
MA	≥35" minimum size; no gaffing undersized fish. 15 fish/day with commercial boat permit; 2 fish/day with rod and reel permit.	735,240 lbs. Hook & Line only.	6.24 until quota reached, Mondays and Wednesdays only. (In-season adjustment added Tuesdays effective Sept 1.) July 3rd, July 4th and Labor Day closed. Cape Cod Canal closed to commercial striped bass fishing.
RI	Floating fish trap: 26" minimum size unlimited possession limit until 70% of quota reached, then 500 lbs. per licensee per day	Total: 148,889 lbs., split 39:61 between the trap and general category. Gill netting prohibited.	4.1 – 12.31
	General category (mostly rod & reel): 34" min. 5 fish/vessel/day limit.		5.20-6.30, 7.1-12.31, or until quota reached. Closed Fridays, Saturdays, and Sundays during both seasons.
CT	Commercial fishing prohibited; bonus program in CT suspended indefinitely in 2020.		
NY	26"-38" size; (Hudson River closed to commercial harvest)	640,718 lbs. Pound Nets, Gill Nets (6-8"stretched mesh), Hook & Line.	6.1 – 12.15, or until quota reached. Limited entry permit only.
NJ*	Commercial fishing prohibited; bonus program: 1 fish at 24" to <28" slot size	215,912 lbs.	5.15 – 12.31 (permit required)
PA	Commercial fishing prohibited		

(Table 9 continued – Summary of commercial regulations in 2020).

STATE	SIZE LIMITS (TL) and TRIP LIMITS	SEASONAL QUOTA	OPEN SEASON
DE	Gill Net: 20" min in DE Bay/River during spring season. 28" in all other waters/seasons.	Gillnet: 135,350 lbs. No fixed nets in DE River.	Gillnet: 2.15-5.31 (2.15-3.30 for Nanticoke River) & 11.15-12.31; drift nets only 2.15-28 & 5.1-31; no trip limit.
	Hook and Line: 28" min	Hook and line: 7,124 lbs.	Hook and Line: 4.1–12.31, 200 lbs./day trip limit
MD	Chesapeake Bay and Rivers: 18–36" Common pool trip limits: Hook and Line - 250 lbs./license/week Gill Net - 300 lbs./license/week	1,445,394 lbs. (part of Bay-wide quota) – Initial quota 1,442,120 lbs. – Adjusted quota due to 2019 overage	Bay Pound Net: 6.1-12.31 Bay Haul Seine: 6.1-12.31 Bay Hook & Line: 6.4-12.31 Bay Drift Gill Net: 1.1-2.28, 12.1-12.31
	Ocean: 24" minimum	Ocean: 89,094 lbs.	1.1-5.31, 10.1-12.31
PRFC	18" min all year; 36" max 2.15–3.25	572,861 lbs. (part of Bay-wide quota)	Hook & Line: 1.1-3.25, 6.1-12.31 Pound Net & Other: 2.15-3.25, 6.1-12.15 Gill Net: 1.1-3.25, 11.9-12.31 Misc. Gear: 2.15-3.25, 6.1-12.15
VA	Bay and Rivers: 18" min; 28" max size limit 3.15–6.15	983,393 lbs. (part of Bay-wide quota)	1.16-12.31
	Ocean: 28" min	125,034 lbs.	
NC	Ocean: 28" min	295,495 lbs. (split between gear types).	Seine fishery was not opened Gill net fishery was not opened Trawl fishery was not opened

Table 10. Summary of Atlantic striped bass recreational regulations in 2020. Source: 2021 State Compliance Reports. Minimum sizes and slot size limits are in total length (TL).

STATE	SIZE LIMITS (TL)/REGION	BAG LIMIT	GEAR/FISHING RESTRICTIONS	OPEN SEASON
ME	28” to <35"	1 fish/day	Hook & line only; circle hooks only when using live bait	All year, except spawning areas are closed 12.1-4.30 and C&R only 5.1-6.30
NH	28” to <35"	1 fish/day	Gaffing and culling prohibited; Use of corrodible non-offset circle hooks required if angling with bait	All year
MA	28” to <35"	1 fish/day	Hook & line only; no high-grading; gaffs and other injurious removal devices prohibited. Private angler circle hook requirement when fishing with natural bait (exception for artificial lures).	All year
RI	28” to <35"	1 fish/day	The use of circle hooks is required by any vessel or person while fishing recreationally with bait for striped bass	All year
CT	28” to <35"	1 fish/day	Inline circle hooks only when using whole, cut or live natural bait (Dec 1st, 2020). Spearing and gaffing prohibited	All year
NY	Ocean and DE River: Slot Size: 28 -35	1 fish/day	Angling only. Spearing permitted in ocean waters. C&R only during closed season.	Ocean: 4.15-12.15 Delaware River: All year
	HR: Slot Size: 18 -28	1 fish/day	Angling only.	Hudson River: 4.1-11.30
NJ	1 fish at 28” to < 38” (effective 4/1/2020)	1 fish/day	Non-offset circle hooks must be used when using bait with a #2 sized hook or larger in Delaware River & tributaries from 4.1-5.31.	Closed 1.1 – last day of Feb in all waters except in the Atlantic Ocean, and closed 4.1-5.31 in the lower DE River and tributaries
PA	Upstream from Calhoun St Bridge: 1 fish at 28” to <35"			
	Downstream from Calhoun St Bridge: 1 fish at 28” to <35”, and 2 fish at 21-24” slot size limit from 4.1 – 5.31			

(Table 10 continued – Summary of recreational regulations in 2020).

STATE	SIZE LIMITS/REGION	BAG LIMIT	GEAR/FISHING RESTRICTIONS	OPEN SEASON
DE	28” to <35"	1 fish/day	Hook & line, spear (for divers) only. Circle hooks required in spawning season.	All year. C&R only 4.1-5.31 in spawning grounds. 20”-25”slot from 7.1-8.31 in DE River, Bay & tributaries
MD	Ocean: 28” to <35"	1 fish/day		All year
	Chesapeake Bay and tribs^+	C&R only	no eels; no stinger hooks; barbless hooks when trolling; circle or J-hooks when using live bait; max 6 lines when trolling	1.1-2.28, 3.1-3.31, 12.11-12.31
	Chesapeake Bay: 35" min	1 fish/day	Geographic restrictions apply+.	5.1-5.15
	Chesapeake Bay: 1 fish/day, 19" minimum size; 2/fish/day for charter with only 1 fish >28"		Geographic restrictions apply+; circle hooks if chumming or live-lining; no treble hooks when bait fishing.	5.16-5.31
	Chesapeake Bay and tribs: 1 fish/day, 19" minimum size; 2/fish/day for charter with only 1 fish >28"		All Bay and tribs open; circle hooks if chumming or live-lining; no treble hooks when bait fishing.	6.1-8.15 (no targeting 8.16-8/31)*, 9.1-12.10
PRFC	Spring Trophy: 1 fish/day, 35” minimum size		No more than two hooks or sets of hooks for each rod or line; no live eel; no high-grading	5.1-5.15
	Summer and Fall: 2 fish/day, 20” min		No more than two hooks or sets of hooks for each rod or line.	5.16-7.6 and 8.21-12.31; closed 7.7-8.20 (No Direct Targeting)

^ Susquehanna Flats: C&R only Jan 1 – March 31 (no treble hooks when bait fishing); 1 fish at 19”-26” slot May 16 – May 31.
+ Maryland maps available here: https://dnr.maryland.gov/fisheries/pages/sb_2020_regs.aspx
*Open season in 2021 for Maryland Chesapeake Bay and tributaries changed to 6.1-7.15 (no targeting 7.16-7.31), 8.1-12.10.

(Table 10 continued – Summary of recreational regulations in 2020).

STATE	SIZE LIMITS/REGION	BAG LIMIT	GEAR/FISHING RESTRICTIONS	OPEN SEASON
DC	18” minimum size	1 fish/day	Hook and line only	5.16-12.31
VA	Ocean: 28”-36” slot limit	1 fish/day	Hook & line, rod & reel, hand line only. No gaffing. Circle hooks required if/when fishing with live bait (as of July 2020).	1.1-3.31, 5.16-12.31
	Ocean Spring Trophy: NO SPRING TROPHY SEASON			
	Chesapeake Bay Spring Trophy: NO SPRING TROPHY SEASON			
	Bay Spring: 20”-28” slot limit	1 fish/day	Hook & line, rod & reel, hand line only. No gaffing. Circle hooks required if/when fishing with live bait (as of July 2020).	5.16-6.15
	Bay Fall: 20 - 36” slot limit	1 fish/day	Hook & line, rod & reel, hand line only. No gaffing. Circle hooks required if/when fishing with live bait (as of July 2020).	10.4-12.31
NC	28” to <35"	1 fish/day	No gaffing allowed. Circle hooks required when fishing with natural bait.	All year

Table 11. Total removals (harvest plus discards/release mortality) of Atlantic striped bass by sector in numbers of fish, 1990-2020. Note: Harvest is from state compliance reports/MRIP (July 8, 2021), discards/release mortality is from ASMFC. Estimates exclude inshore harvest from North Carolina.

Year	Commercial		Recreational		Total Removals
	Harvest	Discards*	Harvest	Release Mortality	
1990	93,888	47,859	578,897	442,811	1,163,455
1991	158,491	92,480	798,260	715,478	1,764,709
1992	256,476	193,281	869,779	937,611	2,257,147
1993	314,526	115,859	789,037	812,404	2,031,826
1994	325,401	166,105	1,055,523	1,360,872	2,907,900
1995	537,412	188,507	2,287,578	2,010,689	5,024,186
1996	854,102	257,749	2,487,422	2,600,526	6,199,800
1997	1,076,591	325,998	2,774,981	2,969,781	7,147,351
1998	1,215,219	347,343	2,915,390	3,259,133	7,737,085
1999	1,223,572	337,036	3,123,496	3,140,905	7,825,008
2000	1,216,812	209,329	3,802,477	3,044,203	8,272,820
2001	931,412	182,606	4,052,474	2,449,599	7,616,091
2002	928,085	199,770	4,005,084	2,792,200	7,925,139
2003	854,326	131,319	4,781,402	2,848,445	8,615,492
2004	879,768	157,724	4,553,027	3,665,234	9,255,753
2005	970,403	146,126	4,480,802	3,441,928	9,039,259
2006	1,047,648	158,808	4,883,961	4,812,332	10,902,750
2007	1,015,114	160,728	3,944,679	2,944,253	8,064,774
2008	1,027,837	106,791	4,381,186	2,391,200	7,907,013
2009	1,049,838	130,200	4,700,222	1,942,061	7,822,321
2010	1,031,430	134,817	5,388,440	1,760,759	8,315,446
2011	944,777	85,503	5,006,358	1,482,029	7,518,667
2012	870,684	198,911	4,046,299	1,847,880	6,963,774
2013	784,379	114,009	5,157,760	2,393,425	8,449,573
2014	750,263	111,753	4,033,746	2,172,342	7,068,103
2015	621,952	84,463	3,085,725	2,307,133	6,099,273
2016	609,028	88,171	3,500,434	2,981,430	7,179,063
2017	592,670	98,343	2,937,911	3,421,110	7,050,035
2018	621,123	100,646	2,244,765	2,826,667	5,793,201
2019	653,807	84,013	2,150,936	2,589,045	5,477,801
2020	577,363	65,319	1,709,973	2,760,231	5,112,886

* Commercial dead discard estimates are derived via a generalized additive model (GAM), and are therefore re-estimated for the entire time series when a new year of data is added.

Table 12. Proportion of total removals (harvest plus discards/release mortality) of Atlantic striped bass by sector in numbers of fish, 1990-2020. Note: Harvest is from state compliance reports/MRIP (July 8, 2021), discards/release mortality is from ASMFC. Estimates exclude inshore harvest from North Carolina.

Year	Commercial		Recreational	
	Harvest	Discards*	Harvest	Release Mortality
1990	8%	4%	50%	38%
1991	9%	5%	45%	41%
1992	11%	9%	39%	42%
1993	15%	6%	39%	40%
1994	11%	6%	36%	47%
1995	11%	4%	46%	40%
1996	14%	4%	40%	42%
1997	15%	5%	39%	42%
1998	16%	4%	38%	42%
1999	16%	4%	40%	40%
2000	15%	3%	46%	37%
2001	12%	2%	53%	32%
2002	12%	3%	51%	35%
2003	10%	2%	55%	33%
2004	10%	2%	49%	40%
2005	11%	2%	50%	38%
2006	10%	1%	45%	44%
2007	13%	2%	49%	37%
2008	13%	1%	55%	30%
2009	13%	2%	60%	25%
2010	12%	2%	65%	21%
2011	13%	1%	67%	20%
2012	13%	3%	58%	27%
2013	9%	1%	61%	28%
2014	11%	2%	57%	31%
2015	10%	1%	51%	38%
2016	8%	1%	49%	42%
2017	8%	1%	42%	49%
2018	11%	2%	39%	49%
2019	12%	2%	39%	47%
2020	11%	1%	33%	54%

* Commercial dead discard estimates are derived via a generalized additive model (GAM), and are therefore re-estimated for the entire time series when a new year of data is added. Note: Percent may not sum to 100 due to rounding.

Table 13. Total harvest of Atlantic striped bass by sector, 1990-2020. Note: Harvest is from state compliance reports/MRIP (Query July 8, 2021). Estimates exclude inshore harvest from North Carolina.

Year	Numbers of Fish			Pounds		
	Commercial	Recreational	Total	Commercial	Recreational	Total
1990	93,888	578,897	672,785	715,902	8,207,515	8,923,417
1991	158,491	798,260	956,751	966,096	10,640,601	11,606,697
1992	256,476	869,779	1,126,255	1,508,064	11,921,967	13,430,031
1993	314,526	789,037	1,103,563	1,800,176	10,163,767	11,963,943
1994	325,401	1,055,523	1,380,924	1,877,197	14,737,911	16,615,108
1995	537,412	2,287,578	2,824,990	3,775,586	27,072,321	30,847,907
1996	854,102	2,487,422	3,341,524	4,822,874	28,625,685	33,448,559
1997	1,076,591	2,774,981	3,851,572	6,078,566	30,616,093	36,694,659
1998	1,215,219	2,915,390	4,130,609	6,552,111	29,603,199	36,155,310
1999	1,223,572	3,123,496	4,347,068	6,474,290	33,564,988	40,039,278
2000	1,216,812	3,802,477	5,019,289	6,719,521	34,050,817	40,770,338
2001	931,412	4,052,474	4,983,886	6,266,769	39,263,154	45,529,923
2002	928,085	4,005,084	4,933,169	6,138,180	41,840,025	47,978,205
2003	854,326	4,781,402	5,635,728	6,750,491	54,091,836	60,842,327
2004	879,768	4,553,027	5,432,795	7,317,897	53,031,074	60,348,971
2005	970,403	4,480,802	5,451,205	7,121,492	57,421,174	64,542,666
2006	1,047,648	4,883,961	5,931,609	6,568,970	50,674,431	57,243,401
2007	1,015,114	3,944,679	4,959,793	7,047,179	42,823,614	49,870,793
2008	1,027,837	4,381,186	5,409,023	7,190,701	56,665,318	63,856,019
2009	1,049,838	4,700,222	5,750,060	7,217,380	54,411,389	61,628,769
2010	1,031,430	5,388,440	6,419,870	6,996,713	61,431,360	68,428,073
2011	944,777	5,006,358	5,951,135	6,789,792	59,592,092	66,381,884
2012	870,684	4,046,299	4,916,983	6,516,761	53,256,619	59,773,380
2013	784,379	5,157,760	5,942,139	5,819,678	65,057,289	70,876,967
2014	750,263	4,033,746	4,784,009	5,937,949	47,948,610	53,886,559
2015	621,952	3,085,725	3,707,677	4,829,997	39,898,799	44,728,796
2016	609,028	3,500,434	4,109,462	4,848,772	43,671,532	48,520,304
2017	592,670	2,937,911	3,530,581	4,816,395	37,952,581	42,768,976
2018	621,123	2,244,765	2,865,888	4,741,342	23,069,028	27,810,370
2019	653,807	2,150,936	2,804,743	4,284,831	23,556,287	27,841,118
2020	577,363	1,709,973	2,287,336	3,560,917	14,858,984	18,419,901

Table 14. Commercial harvest by region in pounds (x1000), 1995-2020. Source: state compliance reports. ^Estimates exclude inshore harvest.

Year	Ocean								Chesapeake Bay				Grand Total
	MA	RI	NY	DE	MD	VA	NC^	Total	MD	PRFC	VA	Total	
1995	751.5	113.5	500.8	38.5	79.3	46.2	344.6	1,874.3	1,185.0	198.5	517.8	1,901.3	3,775.6
1996	695.9	122.6	504.4	120.5	75.7	165.9	58.2	1,743.2	1,487.7	346.8	1,245.2	3,079.7	4,822.9
1997	784.9	96.5	460.8	166.0	94.0	179.1	463.1	2,244.4	2,119.2	731.9	983.0	3,834.2	6,078.6
1998	810.1	94.7	485.9	163.7	84.6	375.0	273.0	2,287.0	2,426.7	726.2	1,112.2	4,265.1	6,552.1
1999	766.2	119.7	491.8	176.3	62.6	614.8	391.5	2,622.9	2,274.8	653.3	923.4	3,851.4	6,474.3
2000	796.2	111.8	542.7	145.1	149.7	932.7	162.4	2,840.5	2,261.8	666.0	951.2	3,879.0	6,719.5
2001	815.4	129.7	633.1	198.6	113.9	782.4	381.1	3,054.1	1,660.9	658.7	893.1	3,212.6	6,266.8
2002	924.9	129.2	518.6	146.2	93.2	710.2	441.0	2,963.2	1,759.4	521.0	894.4	3,174.9	6,138.2
2003	1,055.5	190.2	753.3	191.2	103.9	166.4	201.2	2,661.7	1,721.8	676.6	1,690.4	4,088.7	6,750.5
2004	1,214.2	215.1	741.7	176.5	134.2	161.3	605.4	3,248.3	1,790.3	772.3	1,507.0	4,069.6	7,317.9
2005	1,102.2	215.6	689.8	174.0	46.9	185.2	604.5	3,018.2	2,008.7	533.6	1,561.0	4,103.3	7,121.5
2006	1,322.3	5.1	688.4	184.2	91.1	195.0	74.2	2,560.2	2,116.3	673.5	1,219.0	4,008.7	6,569.0
2007	1,039.3	240.6	731.5	188.7	96.3	162.3	379.5	2,838.1	2,240.6	599.3	1,369.2	4,209.1	7,047.2
2008	1,160.3	245.9	653.1	188.7	118.0	163.1	288.4	2,817.6	2,208.0	613.8	1,551.3	4,373.1	7,190.7
2009	1,134.3	234.8	789.9	192.3	127.3	140.4	190.0	2,809.0	2,267.3	727.8	1,413.3	4,408.4	7,217.4
2010	1,224.5	248.9	786.8	185.4	44.8	127.8	276.4	2,894.7	2,105.8	683.2	1,313.0	4,102.0	6,996.7
2011	1,163.9	228.2	855.3	188.6	21.4	158.8	246.4	2,862.5	1,955.1	694.2	1,278.1	3,927.3	6,789.8
2012	1,218.5	239.9	683.8	194.3	77.6	170.8	7.3	2,592.0	1,851.4	733.7	1,339.6	3,924.7	6,516.8
2013	1,004.5	231.3	823.8	191.4	93.5	182.4	0.0	2,526.9	1,662.2	623.8	1,006.8	3,292.8	5,819.7
2014	1,138.5	216.9	531.5	167.9	120.9	183.7	0.0	2,359.4	1,805.7	603.4	1,169.4	3,578.5	5,937.9
2015	866.0	188.3	516.3	144.1	34.6	138.1	0.0	1,887.5	1,436.9	538.0	967.6	2,942.5	4,830.0
2016	938.7	174.7	575.0	136.5	19.7	139.2	0.0	1,983.9	1,425.5	537.1	902.3	2,864.9	4,848.8
2017	823.4	175.3	701.2	141.8	80.5	133.9	0.0	2,056.1	1,439.8	492.7	827.8	2,760.3	4,816.4
2018	753.7	176.6	617.2	155.0	79.8	134.2	0.0	1,916.6	1,424.3	449.4	951.0	2,824.7	4,741.3
2019	584.7	144.2	358.9	132.6	82.8	138.0	0.0	1,441.2	1,475.2	417.3	951.1	2,843.6	4,284.8
2020	386.9	115.9	473.5	138.0	83.6	77.2	0.0	1,275.1	1,273.8	400.3	611.7	2,285.8	3,560.9

Table 15. Commercial harvest and discards by region in numbers of fish (x1000), 1995-2020. Source: harvest is from state compliance reports, discards is from ASMFC. ^Estimates exclude inshore harvest.

Year	Ocean								Chesapeake Bay				Discards*			Grand Total Removals
	MA	RI	NY	DE	MD	VA	NC^	Total	MD	PRFC	VA	Total	Ocean	Bay	Total	
1995	39.9	19.7	43.7	5.6	4.0	9.9	23.4	146.1	267.0	29.3	95.0	391.3	141.7	46.8	188.5	725.9
1996	37.3	18.6	40.5	20.7	9.0	14.1	3.3	143.5	486.2	46.2	178.2	710.6	168.8	89.0	257.7	1,111.9
1997	44.0	7.1	37.6	33.2	8.4	17.3	25.8	173.4	620.3	87.8	195.2	903.2	249.7	76.3	326.0	1,402.6
1998	44.3	8.8	45.1	31.4	10.3	41.1	14.2	195.2	729.6	93.3	197.1	1,020.1	313.9	33.5	347.3	1,562.6
1999	40.9	11.6	49.9	34.8	10.2	48.7	21.1	217.2	776.0	90.6	139.8	1,006.3	305.2	31.9	337.0	1,560.6
2000	42.1	9.4	54.9	25.2	13.3	54.5	6.5	205.8	787.6	91.5	132.0	1,011.0	176.9	32.5	209.3	1,426.1
2001	45.8	10.9	58.3	34.4	11.1	42.3	25.0	227.7	538.8	87.8	77.1	703.7	140.5	42.2	182.6	1,114.0
2002	49.8	11.7	47.1	30.4	10.2	38.8	23.2	211.3	571.7	80.3	64.7	716.8	151.2	48.6	199.8	1,127.9
2003	56.4	15.5	68.4	31.5	11.6	10.5	5.8	199.6	427.9	83.1	143.7	654.7	98.8	32.5	131.3	985.6
2004	63.6	16.0	70.4	28.4	14.1	10.4	31.0	233.9	447.0	92.6	106.3	645.9	111.4	46.3	157.7	1,037.5
2005	60.5	14.9	70.6	26.3	6.1	11.3	27.3	217.1	563.9	80.6	108.9	753.3	87.2	58.9	146.1	1,116.5
2006	70.5	15.4	73.6	30.2	10.9	11.5	2.7	214.9	645.1	92.3	95.4	832.7	99.0	59.8	158.8	1,206.5
2007	54.2	13.9	78.5	31.1	11.6	10.6	16.8	216.7	587.6	86.5	124.3	798.4	94.3	66.4	160.7	1,175.8
2008	61.1	16.6	73.3	31.9	14.0	10.8	13.4	221.0	580.7	82.0	144.1	806.8	63.6	43.1	106.8	1,134.6
2009	59.4	16.8	82.6	21.6	12.5	8.9	9.0	210.9	605.6	89.6	143.8	839.0	60.5	69.7	130.2	1,180.0
2010	60.4	15.7	82.4	19.8	5.4	9.4	13.7	206.7	579.2	90.6	154.9	824.7	40.4	94.5	134.8	1,166.2
2011	58.7	14.3	87.4	20.5	2.1	12.2	10.9	206.0	488.9	96.1	153.7	738.7	35.0	50.5	85.5	1,030.3
2012	61.5	15.0	67.1	15.7	6.9	10.8	0.3	177.3	465.6	90.7	137.0	693.4	25.5	173.4	198.9	1,069.6
2013	58.6	13.8	76.2	17.7	7.6	10.0	0.0	183.8	391.5	78.0	131.0	600.5	36.5	77.5	114.0	898.4
2014	58.0	10.5	52.9	14.9	8.5	10.0	0.0	154.8	362.2	81.5	151.8	595.5	46.3	65.5	111.8	862.0
2015	42.3	11.3	45.6	11.0	2.6	7.7	0.0	120.4	298.3	71.0	132.2	501.5	33.8	50.7	84.5	706.4
2016	48.0	11.7	51.0	8.8	1.2	7.6	0.0	128.3	284.9	73.7	122.2	480.8	41.3	46.8	88.2	697.2
2017	41.2	10.1	61.6	9.5	3.5	7.6	0.0	133.5	263.6	67.5	128.0	459.2	78.1	20.2	98.3	691.0
2018	37.8	10.1	52.2	11.4	3.5	6.9	0.0	121.9	286.4	64.4	148.4	499.3	61.4	39.3	100.6	721.8
2019	29.6	7.3	29.6	8.2	3.3	6.9	0.0	84.9	356.7	62.6	149.6	568.9	19.4	64.6	84.0	737.8
2020	19.6	5.0	44.1	8.4	3.4	4.4	0.0	84.9	299.9	66.6	125.9	391.3	18.6	46.7	65.3	642.7

* Commercial dead discard estimates are derived via a generalized additive model (GAM), and are therefore re-estimated for the entire time series when a new year of data is added.

Table 16. Total recreational catch, releases, and release mortality in numbers of fish by region (x1000), 1995-2020. Source: MRIP (Query July 8, 2021). Estimates exclude inshore harvest from North Carolina.

Year	Harvest (A+B1)			Releases (B2)			Total Catch (A+B1+B2)			Release Mortality (9% of B2)		
	Ocean	Bay	Total	Ocean	Bay	Total	Ocean	Bay	Total	Ocean	Bay	Total
1995	1,260	1,028	2,288	16,587	5,754	22,341	17,847	6,782	24,629	1,493	518	2,011
1996	1,362	1,125	2,487	22,384	6,511	28,895	23,746	7,636	31,382	2,015	586	2,601
1997	1,514	1,261	2,775	22,819	10,178	32,998	24,333	11,439	35,773	2,054	916	2,970
1998	1,647	1,268	2,915	29,294	6,918	36,213	30,941	8,187	39,128	2,637	623	3,259
1999	1,758	1,366	3,123	26,139	8,760	34,899	27,897	10,125	38,022	2,353	788	3,141
2000	2,198	1,604	3,802	25,090	8,734	33,824	27,289	10,338	37,627	2,258	786	3,044
2001	2,758	1,294	4,052	21,073	6,145	27,218	23,831	7,440	31,270	1,897	553	2,450
2002	2,756	1,249	4,005	23,653	7,371	31,024	26,409	8,620	35,030	2,129	663	2,792
2003	3,124	1,658	4,781	20,678	10,971	31,649	23,802	12,628	36,431	1,861	987	2,848
2004	3,078	1,475	4,553	27,868	12,857	40,725	30,946	14,332	45,278	2,508	1,157	3,665
2005	3,182	1,299	4,481	28,663	9,580	38,244	31,845	10,879	42,724	2,580	862	3,442
2006	2,789	2,095	4,884	41,239	12,232	53,470	44,028	14,327	58,354	3,711	1,101	4,812
2007	2,327	1,618	3,945	25,135	7,579	32,714	27,462	9,196	36,659	2,262	682	2,944
2008	3,025	1,356	4,381	21,878	4,691	26,569	24,904	6,046	30,950	1,969	422	2,391
2009	2,898	1,803	4,700	16,740	4,838	21,578	19,638	6,641	26,279	1,507	435	1,942
2010	3,906	1,483	5,388	13,606	5,957	19,564	17,512	7,440	24,952	1,225	536	1,761
2011	3,617	1,389	5,006	12,644	3,823	16,467	16,261	5,212	21,473	1,138	344	1,482
2012	3,071	975	4,046	11,242	9,290	20,532	14,314	10,265	24,578	1,012	836	1,848
2013	3,723	1,435	5,158	19,463	7,131	26,594	23,186	8,565	31,751	1,752	642	2,393
2014	2,276	1,758	4,034	15,107	9,031	24,137	17,382	10,789	28,171	1,360	813	2,172
2015	1,770	1,316	3,086	15,419	10,216	25,635	17,189	11,532	28,721	1,388	919	2,307
2016	1,817	1,683	3,500	17,794	15,333	33,127	19,611	17,016	36,627	1,601	1,380	2,981
2017	1,738	1,200	2,938	28,963	9,050	38,012	30,701	10,249	40,950	2,607	814	3,421
2018	1,195	1,050	2,245	22,739	8,669	31,407	23,933	9,719	33,652	2,046	780	2,827
2019	1,342	809	2,151	21,131	7,636	28,767	22,473	8,445	30,918	1,902	687	2,589
2020	923	787	1,710	22,710	7,959	30,669	23,633	8,746	32,379	2,044	716	2,760

Table 17. Recreational harvest by region in pounds (x1000), 1995-2020. Source: MRIP (Query July 8, 2021). ^Estimates exclude inshore harvest.

Year	Ocean												Chesapeake Bay			Grand Total
	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	NC^	Total	MD	VA	Total	
1995	83	127	2,739	1,049	1,331	5,594	8,587	301	0.0	141	232	20,184	3,115	3,773	6,889	27,072
1996	95	183	2,983	1,626	1,405	10,739	3,959	795	0.0	812	392	22,990	2,789	2,847	5,636	28,626
1997	223	538	5,133	1,997	2,263	8,543	2,179	374	0.0	1,096	865	23,211	3,203	4,203	7,405	30,616
1998	305	262	7,359	1,544	1,807	4,889	4,182	645	579	545	636	22,754	3,023	3,826	6,849	29,603
1999	196	181	4,995	1,904	1,327	7,414	9,473	312	3.8	110	339	26,256	2,323	4,986	7,309	33,565
2000	347	109	4,863	2,008	890	7,053	9,768	925	0.0	416	277	26,656	3,503	3,892	7,395	34,051
2001	446	334	7,188	2,044	1,101	5,058	12,314	695	314	382	1,082	30,959	2,928	5,376	8,304	39,263
2002	775	322	10,261	2,708	1,251	5,975	9,621	589	0.0	1,135	998	33,634	2,643	5,563	8,206	41,840
2003	458	466	10,252	4,052	2,666	10,788	12,066	763	14	392	966	42,882	5,246	5,964	11,210	54,092
2004	554	268	9,329	2,460	2,229	6,437	13,303	870	57	1,067	6,656	43,230	4,860	4,941	9,801	53,031
2005	546	384	7,541	3,155	3,133	11,637	14,289	680	7.7	487	3,947	45,808	7,753	3,860	11,614	57,421
2006	610	244	6,787	1,569	2,854	9,845	12,716	586	2.8	921	2,975	39,109	6,494	5,071	11,565	50,674
2007	422	93	7,010	2,077	2,786	10,081	8,390	207	0.0	516	1,965	33,547	5,249	4,027	9,277	42,824
2008	607	182	8,424	970	2,273	18,000	12,407	847	0.0	1,690	750	46,150	5,639	4,877	10,515	56,665
2009	781	222	9,410	2,185	1,458	7,991	17,040	940	138	48	187	40,399	8,672	5,340	14,012	54,411
2010	218	238	9,959	2,102	2,323	18,190	17,454	895	107	206	1,198	52,891	6,482	2,059	8,541	61,431
2011	245	659	11,953	3,066	981	13,151	15,715	605	8.6	308	4,467	51,157	6,220	2,214	8,435	59,592
2012	152	432	14,941	2,096	1,835	13,096	11,551	644	21	1.7	0.0	44,768	3,819	4,670	8,488	53,257
2013	331	831	9,025	4,428	4,236	16,819	19,451	1,073	1,051	67	0.0	57,313	5,137	2,607	7,744	65,057
2014	423	203	7,965	3,402	2,665	13,998	8,886	381	159	0.0	0.0	38,083	8,877	989	9,866	47,949
2015	132	202	7,799	1,394	2,585	8,695	9,982	340	28	0.0	0.0	31,156	7,786	957	8,743	39,899
2016	189	191	3,731	1,776	912	12,053	12,790	86	7.2	0.0	0.0	31,735	10,912	1,024	11,936	43,672
2017	318	394	5,664	1,655	1,560	8,885	10,886	666	0.0	1.8	0.0	30,030	7,309	613	7,922	37,953
2018	142	130	4,925	1,121	1,165	3,453	7,012	33	0.0	0.0	0.0	17,982	4,683	404	5,087	23,069
2019	415	291	2,698	2,300	685	7,072	6,674	44	7.3	0.0	0.0	20,187	3,145	224	3,370	23,556
2020	180	29	776	483	830	2,202	6,584	16	0.0	0.0	0.0	11,100	3,480	280	3,759	14,859

Table 18. Recreational harvest by region in numbers of fish (x1000), 1995-2020. Source: MRIP (Query July 8, 2021). ^Estimates exclude inshore harvest.

Year	Ocean												Chesapeake Bay			Grand Total
	ME	NH	MA	RI	CT	NY	NJ	DE	MD	VA	NC^	Total	MD	VA	Total	
1995	4.0	7.4	124.3	70.9	75.8	250.3	671.4	25.8	0.1	13.4	16.5	1,259.8	491.1	536.7	1,027.7	2,287.6
1996	4.1	11.0	156.6	100.6	95.9	511.6	301.2	59.7	0.0	89.6	31.7	1,362.0	564.2	561.3	1,125.5	2,487.4
1997	43.0	29.9	365.6	124.7	149.0	450.5	171.2	29.1	0.0	91.1	60.1	1,514.1	552.4	708.4	1,260.8	2,775.0
1998	65.3	14.8	500.9	91.1	114.1	383.8	289.2	51.0	24.3	71.3	41.2	1,647.0	596.2	672.2	1,268.4	2,915.4
1999	37.5	9.9	327.1	116.6	88.2	450.9	657.1	28.3	1.6	14.1	26.4	1,757.8	530.9	834.8	1,365.7	3,123.5
2000	77.3	6.0	306.2	156.8	84.0	494.6	939.8	88.3	0.0	27.2	18.1	2,198.3	810.9	793.3	1,604.2	3,802.5
2001	91.9	23.5	551.0	149.8	78.2	364.2	1,267.5	70.6	64.1	36.7	60.7	2,758.1	513.3	781.1	1,294.4	4,052.5
2002	135.2	28.1	723.5	181.5	92.5	439.3	957.6	65.7	0.0	76.4	56.3	2,756.1	464.4	784.6	1,249.0	4,005.1
2003	99.7	41.3	797.2	226.4	181.7	678.4	942.8	75.7	0.9	29.3	50.4	3,123.8	816.0	841.6	1,657.6	4,781.4
2004	118.3	22.1	666.7	159.6	134.5	458.1	1,042.1	66.6	11.0	75.9	323.2	3,078.1	657.5	817.4	1,474.9	4,553.0
2005	118.3	35.5	536.1	195.6	202.6	854.6	958.1	48.8	3.6	34.2	194.9	3,182.2	815.5	483.1	1,298.6	4,480.8
2006	140.9	20.9	483.2	129.3	168.3	614.8	972.2	44.5	0.4	80.6	134.2	2,789.0	1,342.0	753.0	2,094.9	4,884.0
2007	95.5	8.1	471.9	135.8	163.9	602.8	722.2	17.2	0.0	28.0	81.8	2,327.1	1,127.3	490.3	1,617.6	3,944.7
2008	133.4	11.9	514.1	73.4	132.8	1,169.9	791.0	67.7	0.0	94.4	36.9	3,025.4	779.7	576.1	1,355.8	4,381.2
2009	146.5	17.3	695.0	138.4	100.3	574.2	1,141.5	64.8	10.2	3.0	6.5	2,897.7	1,094.4	708.1	1,802.5	4,700.2
2010	37.3	21.4	808.2	162.0	170.2	1,449.0	1,091.4	61.4	12.5	25.3	67.1	3,905.9	1,139.3	343.2	1,482.6	5,388.4
2011	48.5	54.2	873.5	202.2	91.1	1,005.3	1,038.9	43.7	0.8	51.2	207.6	3,617.1	1,112.1	277.2	1,389.3	5,006.4
2012	31.4	37.3	1,010.6	130.7	137.1	927.5	742.4	51.3	2.9	0.3	0.0	3,071.5	716.7	258.1	974.8	4,046.3
2013	73.3	63.2	658.7	308.3	269.6	902.5	1,324.2	70.6	48.4	4.4	0.0	3,723.2	1,136.7	297.9	1,434.5	5,157.8
2014	86.4	16.5	523.5	172.0	131.8	804.5	501.9	26.2	12.6	0.0	0.0	2,275.5	1,627.0	131.2	1,758.2	4,033.7
2015	14.4	10.0	485.3	67.0	140.8	406.8	600.3	41.9	3.5	0.0	0.0	1,770.1	1,108.0	207.7	1,315.7	3,085.7
2016	14.2	17.6	230.1	128.4	63.3	697.7	659.6	5.9	0.5	0.0	0.0	1,817.2	1,545.1	138.1	1,683.2	3,500.4
2017	22.0	37.7	392.3	59.8	94.9	477.3	626.4	27.8	0.0	0.1	0.0	1,738.3	1,091.6	108.0	1,199.6	2,937.9
2018	16.0	13.4	389.5	39.2	85.5	181.7	465.3	4.2	0.0	0.0	0.0	1,194.6	993.3	56.8	1,050.1	2,244.8
2019	38.0	14.7	195.6	104.1	67.1	498.0	412.9	10.9	1.0	0.0	0.0	1,342.2	764.1	44.6	808.7	2,150.9
2020	19.0	3.2	67.2	36.9	71.2	203.7	520.1	1.6	0.0	0.0	0.0	922.9	734.8	52.2	787.0	1,710.0

10.0 FIGURES

Note: Figures 1-5 are in-text.

Figure 6. Atlantic striped bass female spawning stock biomass and recruitment, 1982-2017. Source: 2018 Benchmark Stock Assessment.

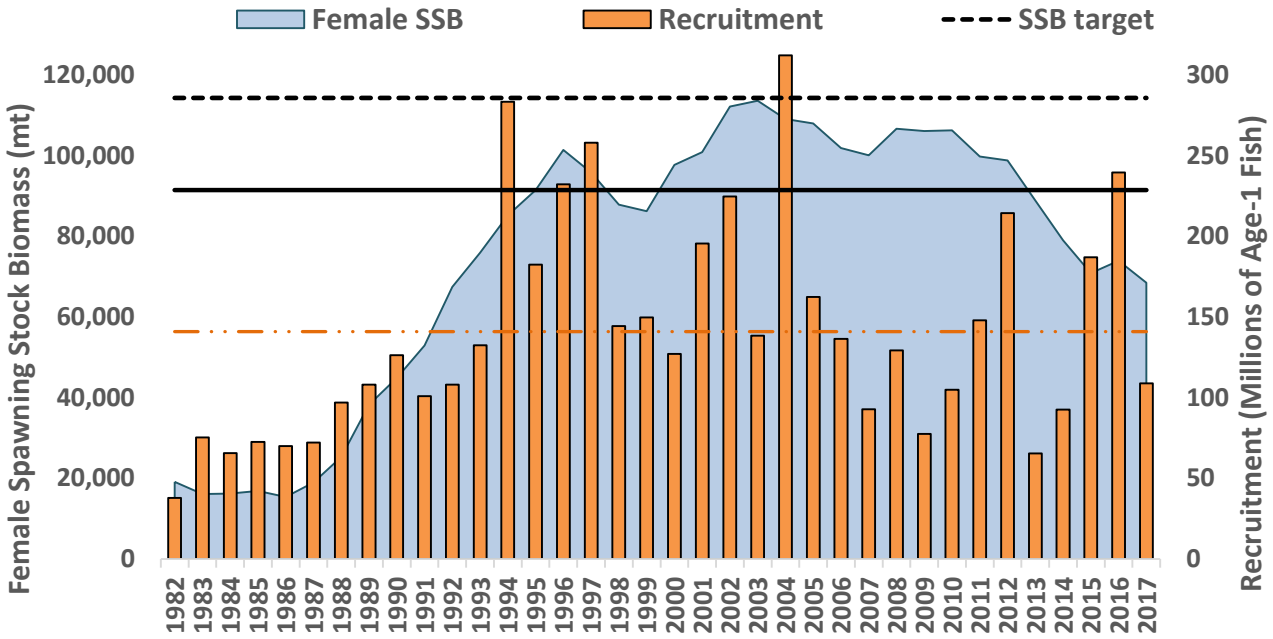


Figure 7. Atlantic striped bass fishing mortality, 1982-2017. Source: 2018 Benchmark Stock Assessment.

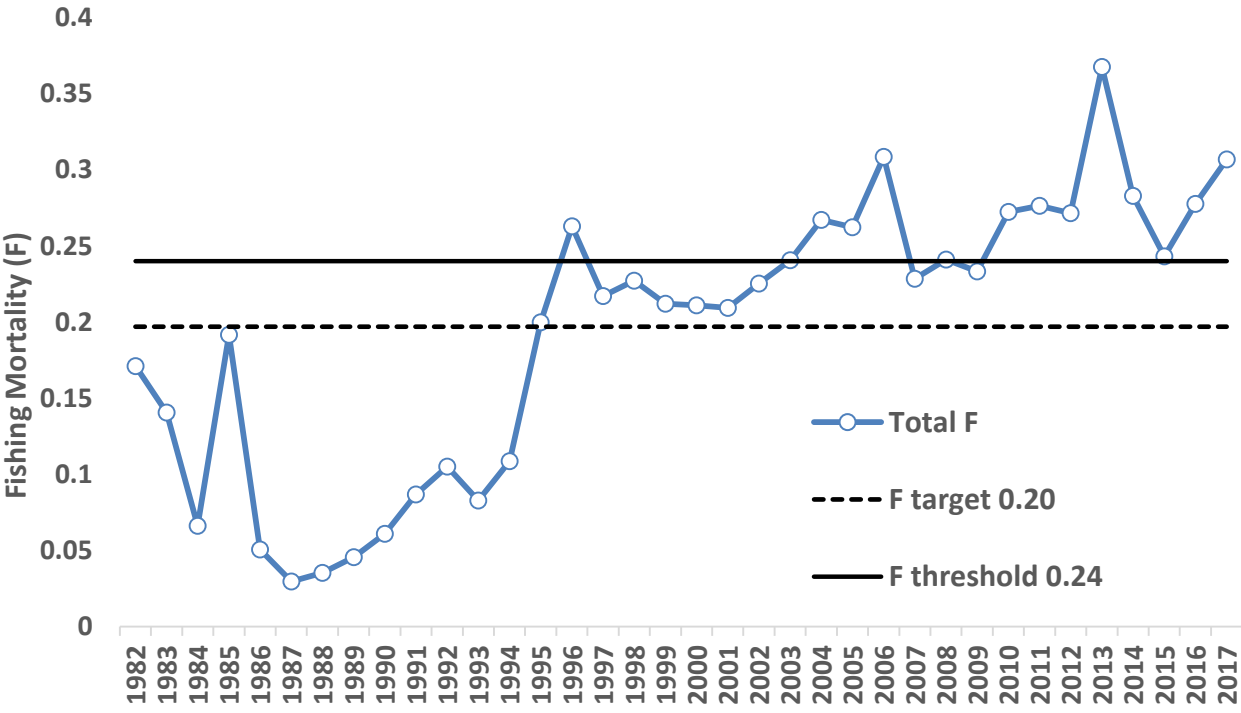


Figure 8. Albemarle Sound-Roanoke River striped bass female spawning stock biomass and recruitment (abundance of age-1), and biological reference points, 1991-2017. Source: 2020 Albemarle Sound-Roanoke River Stock Assessment (Lee et al. 2020).

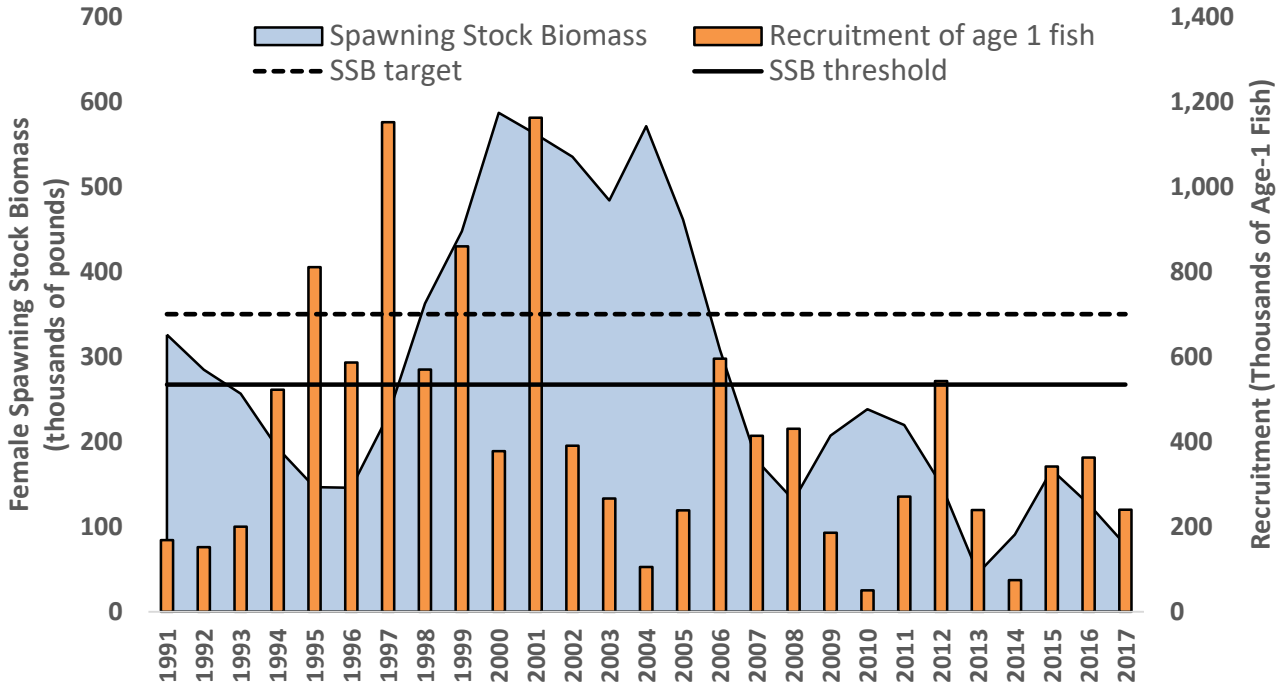


Figure 9. Albemarle Sounds-Roanoke River striped bass fishing mortality (F) estimates, and biological reference points, 1991-2017. Source: 2020 Albemarle Sound-Roanoke River Stock Assessment (Lee et al. 2020).

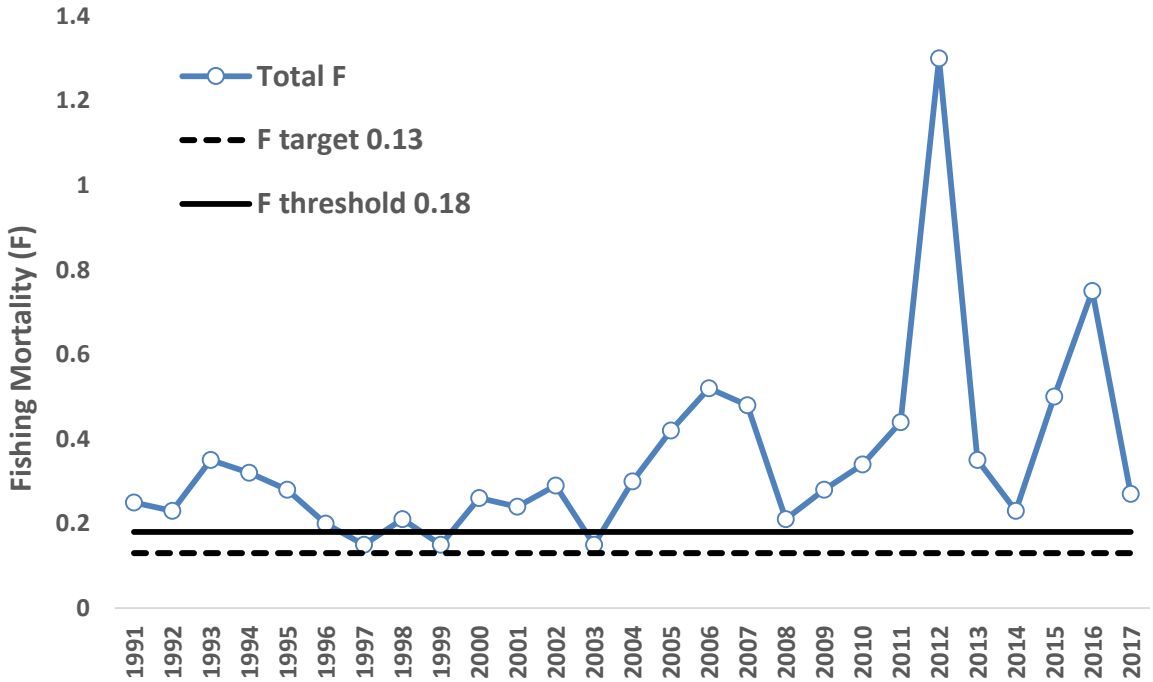


Figure 10. Total Atlantic striped bass removals by sector in numbers of fish, 1982-2020. Note: Harvest is from state compliance reports/MRIP, discards/release mortality is from ASMFC. Estimates exclude inshore harvest from Albemarle Sound-Roanoke River.

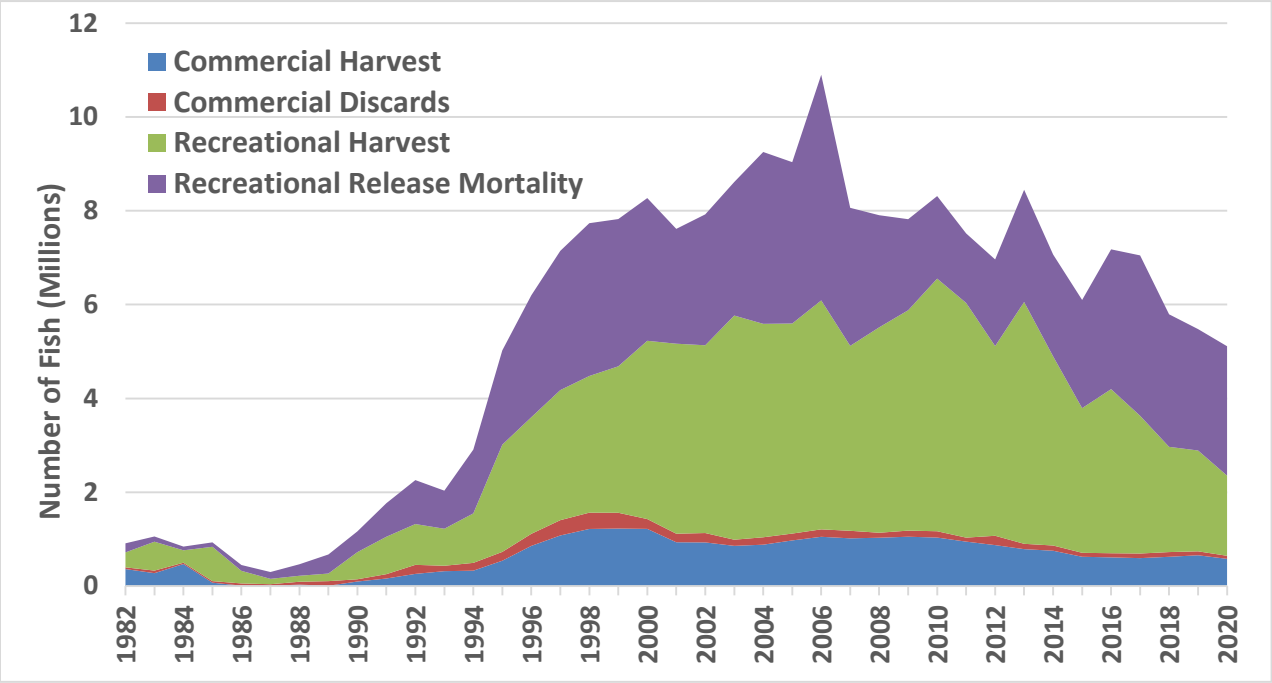


Figure 11. Commercial Atlantic striped bass landings by state in pounds, 1990-2020. Source: State compliance reports. Commercial harvest and sale prohibited in ME, NH, CT, and NJ. NC is ocean only.

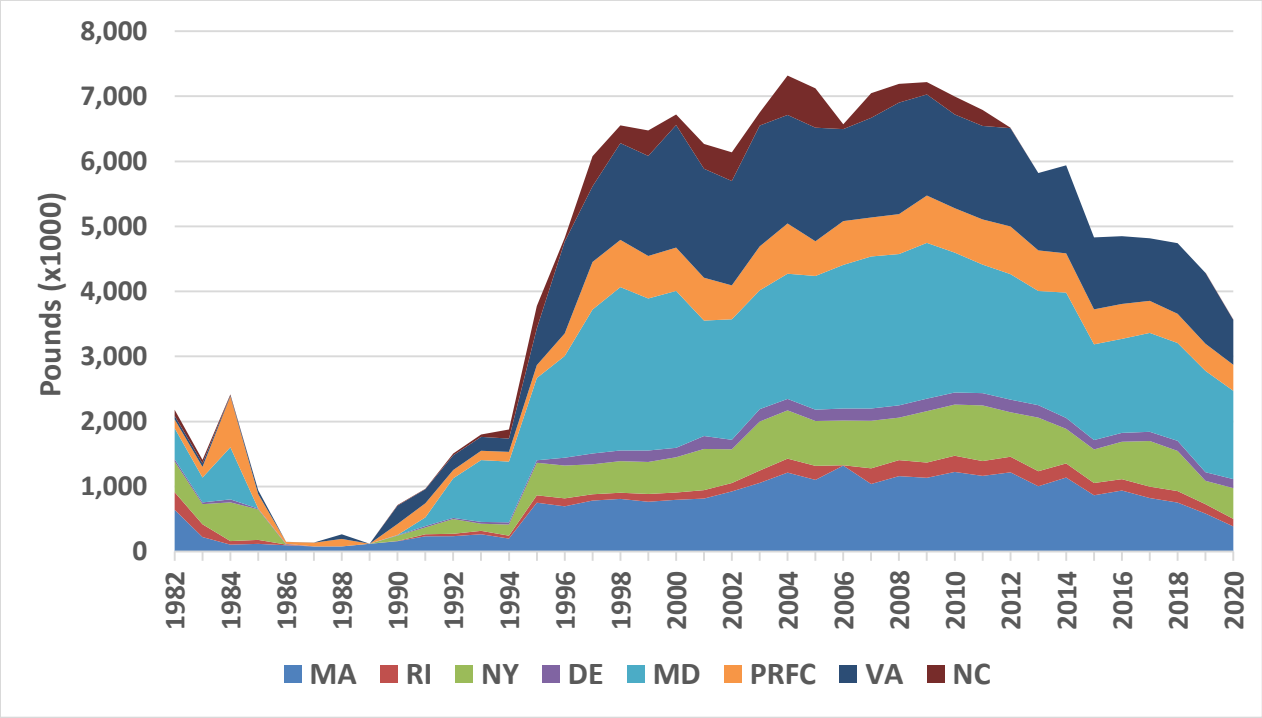
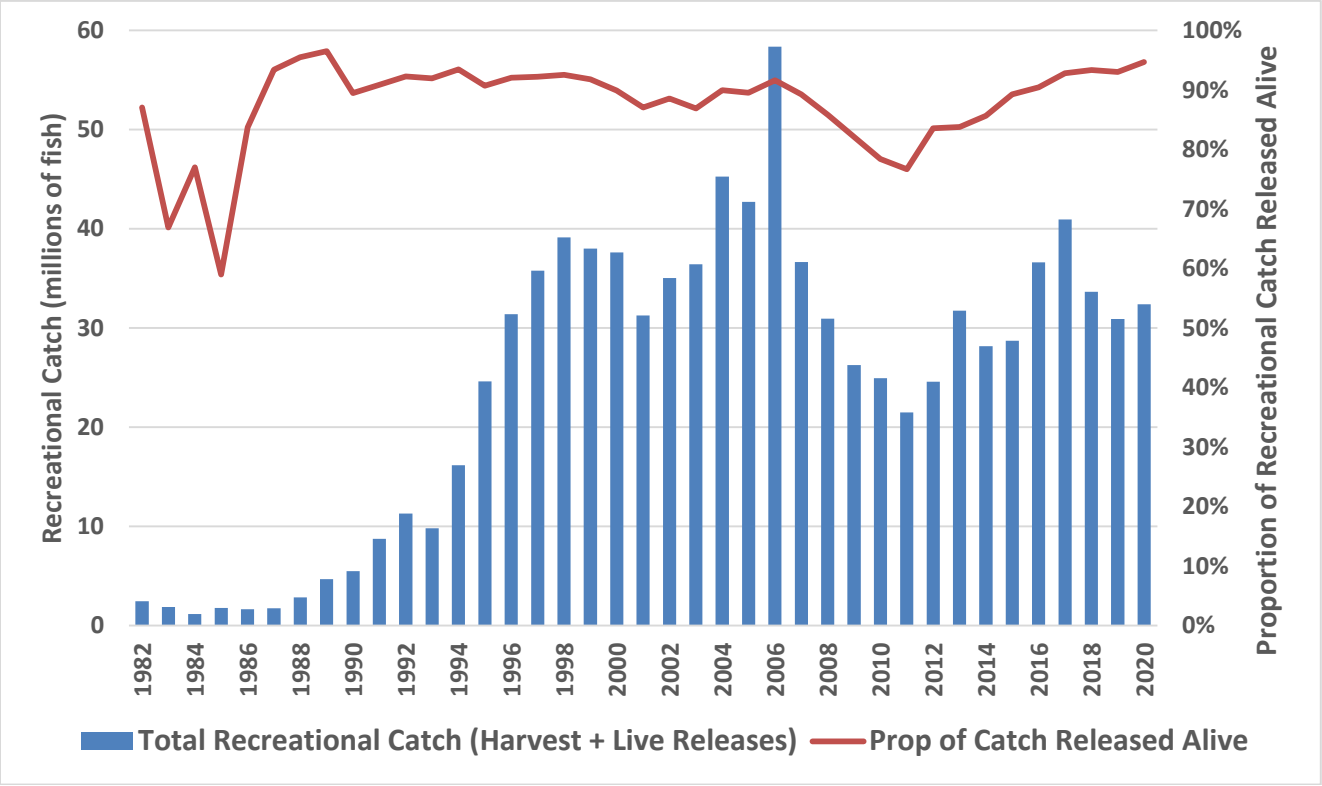


Figure 12. Total recreational catch and the proportion of fish released alive, 1982-2020. Source: MRIP/ASMFC. Estimates exclude inshore harvest from Albemarle Sound-Roanoke River.



APPENDIX 1: SUMMARY OF FISHERY DEPENDENT AND INDEPENDENT MONITORING PROGRAMS

Table A-1. Summary of juvenile abundance index surveys including the state/agency responsible for conducting each survey.

RESPONSIBLE STATE AND AGENCY	SAMPLING AREAS
Maine: *Department of Natural Resources*	Kennebec River
New York: *Department of Environmental Conservation*	Hudson River
New Jersey: *Department of Environmental Protection*	Delaware River
Maryland: *Department of Natural Resources*	Chesapeake Bay Tributaries
Virginia: *Marine Resources Commission*	Chesapeake Bay Tributaries
North Carolina: *Division of Marine Fisheries*	Albemarle Sound

Table A-2. Summary of spawning stock biomass surveys including the state/agency responsible for conducting each survey.

RESPONSIBLE STATE AND AGENCY	SAMPLING AREAS
New York: *Department of Environmental Conservation*	Hudson River[1]
Pennsylvania: *Fish and Boat Commission*	Delaware River[2]
Delaware: *Division of Fish and Wildlife*	Delaware River[3]
Maryland: *Department of Natural Resources*	Upper Chesapeake Bay[4] Potomac River[5]
Virginia: *Marine Resources Commission*	Rappahannock River[6] James River[7]
North Carolina: *Division of Marine Fisheries*	Roanoke River[8] Albemarle Sound[9]

[1] Hudson River, West Point to Catskill
[2] Delaware River, State line to the Tacony-Palmyra Bridge
[3] Delaware River, Delaware Memorial Bridge to state line
[4] Upper Chesapeake Bay, Worton Point to Elkton
[5] Potomac River, Maryland Point to White Stone Point
[6] Rappahanock River, Tappahannock to Federicksburg
[7] James River, Dancing Point to Tax Point
[8] Roanoke River, upriver to spawning grounds
[9] Albemarle Sound, Western sound approaches to river

Table A-3. Required Fishery-Dependent Monitoring Programs under Amendment 7

STUDY CATEGORY	NEEDS & GENERAL GUIDELINES	RESPONSIBLE STATE/ AGENCIES
Commercial catch composition	**NEED:** Define structure of exploitation, calculation of mortality rates **GUIDELINES:** Samples should be representative of location and seasonal distribution of catch, and should include size and sex composition. Collection of scales is conditional; if scale:age relationships from previous years are validated, indirect methods may be used.	MA, RI, NY, DE, MD, VA, PRFC, NC
Commercial catch and effort	**NEED:** Track mortality in a general way **GUIDELINES:** Surveys should produce reliable measures of catch (numbers and weight) and effort in gear days fished.	MA, NY, DE, MD, VA, PRFC
Recreational catch composition	**NEED:** Define structure of exploitation, calculation of mortality rates **GUIDELINES:** Samples should be representative of location, seasonal distribution, and age and size frequency (including sublegals).	MA, RI, CT, NY, NJ, MD, VA, PRFC
Recreational catch and effort	**NEED:** Track mortality in a general way **GUIDELINES:** States should report data from the Marine Recreational Information Program (MRIP) (refer to Section 3.4). States may supplement MRIP with specialized striped bass surveys to better assess harvest.	NMFS, MA, RI, CT, NY, NJ, MD, VA, PRFC

Atlantic States Marine Fisheries Commission

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MEMORANDUM

TO: **Atlantic Striped Bass Management Board**

FROM: **Emilie Franke, FMP Coordinator**

DATE: **April 18, 2022**

SUBJECT: **Draft Amendment 7 Public Hearing Summaries**

Twelve public hearings were held for eleven jurisdictions from March 8 through March 29, 2022 for Striped Bass Draft Amendment 7. Eight hearings were conducted via webinar only: Maine, Massachusetts, Rhode Island, Connecticut, New Jersey-Pennsylvania, Delaware, Maryland, Virginia. Three public hearings were conducted in-person: New York (Kings Park), New York (New Paltz), Potomac River Fisheries Commission-District of Columbia. One hearing was conducted in a hybrid format with attendees participating via webinar and in-person: New Hampshire.

493 individuals (not including state staff, ASMFC staff, or Commissioners/Proxies) attended the hearings, and some of these individuals attended and provided comments at multiple hearings. Each public hearing is summarized in the following pages and the summaries are ordered from north to south. Live polls or a show-of-hands vote were used at most hearings for some of the proposed options; the summaries indicate when a poll or vote was used. Each hearing summary lists the number of public participants who attended the hearing (not including state staff, ASMFC staff, or Commissioners/Proxies) as well as the number of people who provided comments and/or participated in polls during the hearing. Full attendance lists for each hearing are provided following the hearing summaries.

Note: A summary of all public comment (written and hearing comments) received by ASMFC on Striped Bass Draft Amendment 7 will be available no later than supplemental materials for the 2022 Spring Meeting.

Maine Public Hearing
Striped Bass Draft Amendment 7
March 23, 2022 – Webinar

Public Attendees: 68
Hearing Officers: Megan Ware (ME DMR)
ASMFC Staff: Emilie Franke, Toni Kerns, Maya Drzewicki

ME Management Board/Proxies in attendance:
Megan Ware, Pat Keliher

Polls/Commenters:	
ME	44
NH	3
NY	6
DE	1

54 attendees provided comments/participated in virtual polls, including comments on behalf of the New England Chapter of Backcountry Hunters and Anglers (NEBHA)

Management Triggers

- General comments on the need for conservative, aggressive triggers that require action immediately, proactively with no delay

Tier 1: F Triggers

- 38 people (poll) support reducing F to the target within 1 year (A1), including NEBHA, with comments supporting responsive management triggers instead of extended deadlines for stability
- 5 (poll) supports reducing F to the target within 2 years (A2)
- 26 people support status quo F triggers (B1 and C1), including NEBHA

Tier 2: SSB Triggers

- 24 people support a 2-year deadline to implement a rebuilding plan (A2), including NEBHA, with comments supporting matching the rebuilding timeline required for federally managed species
- 26 people support status quo SSB threshold trigger (B1), including NEBHA
- 22 people supports status quo SSB target trigger (C1)
- 4 people support decoupling SSB from F for the SSB target trigger (C2), including NEBHA

Tier 3: Recruitment Trigger

- 7 people support moderate sensitivity trigger (A2), including NEBHA, with comments on the importance of protecting remaining young fish and not missing opportunities to protect year classes like the 2015s and 2017s
- 7 people support the most conservative recruitment trigger response (B2), including NEBHA, with comments on not having a margin for error considering climate change and spawning success

Tier 4: Deferred Management Action

- 32 people (poll) support status quo no deferred management action (A), including NEBHA, with comments on taking action as quickly as possible
- 4 people (poll) support deferring if it's been less than three years since the last action;
- 4 person supports deferring if SSB meets criteria (C,D,E);
- 5 person (poll) supports deferring if action has already been initiated in response to another trigger (F)

Recreational Release Mortality

Seasonal Closures

- 6 people (poll) support statewide no-targeting closures for 2 weeks (B1) with comments noting support if closures occur during warmest weeks
- 31 people (poll) support no-harvest spawning area closures for January-April (B2-a)
- 21 people (poll) support no-targeting spawning ground closures for 2 weeks (B2-b)
- 16 people, including NEBHA, noted opposition to no-targeting closure options, particularly B1, due to lack of data to quantify the benefit of closures, enforcement concerns, and that Maine has favorable water conditions for survival (does not have the same warm water concerns as other states)
- 1 person noted concern that these closures do not apply to commercial fishing

Gear Restrictions

- 45 people (poll) support prohibiting devices other than non-lethal devices for removing striped bass from the water (C1), including NEBHA
- 37 people (poll) support requiring the release of incidentally caught striped bass on any unapproved method of take (C2), including NEBHA
- 1 person supports limiting to just single hooks

Outreach/Education

- 4 people noted support for required outreach (D1) with comments noting the disconnect between the public's understanding and what is happening on the water
- 5 people, including NEBHA, noted support for recommended outreach (D2) with comments of not wanting to interfere with agency resources by implementing required outreach

Rebuilding Plan

- 9 people (poll) support the standard recruitment method (A) for the 2022 assessment
- 30 people (poll) support the low recruitment assumption (B) for the 2022 assessment, including NEBHA, with comments supporting a conservative approach
- 6 people (poll) support the status quo addendum process (A)
- 31 people (poll) support the faster Board action process (B), including NEBHA, with comments that public comment should still be part of and considered in this faster process

Conservation Equivalency

- General comments that CE has been misused as a loophole to harvest more fish and there should be restrictions on the use of CE, as well as penalties to remain accountable
- 2 people (poll) supports status quo Board discretion on CE (A)
- 25 people (poll) support stock status CE restrictions (B)
    - 18 people noted support for B1-a: no CE if the stock is overfished, including NEBHA, with comments on rebuilding being prioritized over regional needs and CE being abused in the past
    - 5 noted support for B1-c: no CE if overfishing is occurring
- 14 people (poll) support MRIP PSE standards (C) for CE proposals
    - 8 people noted support for C3: 30 PSE limit, including NEBHA, with comments this is the accepted standard
- 18 people (poll) support CE uncertainty buffers (D)
    - 8 people noted support for D2: 25% buffer, including NEBHA
- 16 people (poll) support defining equivalency (E) for CE proposals
    - 8 people noted support for E2: equivalency to state-specific projection, including NEBHA

General Comments:

- Maine is at the top of the US range and so sees declines more dramatically than other states
- Desire to rebuild as quickly as possible and maintain abundance Public is frustrated at the slow speed of Commission process
- 1 person noted support for catch and release only until the stock rebounds
- Concern regarding climate change and habitat degradation

Attendance

- *Attendee list attached separately*
- *Additional ME state staff: Victoria Batter, Jeff Nichols*

New Hampshire Public Hearing
Striped Bass Draft Amendment 7
March 29, 2022 – Hybrid (Portsmouth, NH and Webinar)

Public Attendees: 29
Hearing Officers: Cheri Patterson (NHFG)
ASMFC Staff: Emilie Franke, Savannah Lewis

NH Management Board/Proxies in attendance:
Cheri Patterson, Ritchie White, Renee Zobel

23 attendees provided comments/participated in virtual polls, including comments on behalf of the New England Chapter of Backcountry Hunters and Anglers (NEBHA)

Polls/Commenters:	
NH	15
ME	2
MA	2
NY	2
NJ	1
MD	1

Management Triggers

- General comments on the need for the most aggressive, conservative triggers to rebuild the stock and limiting flexibility

Tier 1: F Triggers

- 17 people (poll) support reducing F to the target within 1 year (A1), including NEBHA
- 2 (poll) supports reducing F to the target within 2 years (A2)
- 8 people support status quo F threshold trigger (B1) and 6 people support the status quo F target trigger (C1), including NEBHA

Tier 2: SSB Triggers

- 8 people support a 2-year deadline to implement a rebuilding plan (A2), including NEBHA
- 8 people support status quo SSB threshold trigger (B1), including NEBHA
- 6 people support decoupling SSB from F for the SSB target trigger (C2), including NEBHA

Tier 3: Recruitment Trigger

- 6 people support moderate sensitivity trigger (A2), including NEBHA, with comments on the importance of improving this trigger
- 8 people support the most conservative recruitment trigger response (B2), including NEBHA

Tier 4: Deferred Management Action

- 12 people (poll) support status quo no deferred management action (A), including NEBHA
- 1 people (poll) support deferring if it's been less than three years since the last action;
- 4 people (poll) support deferring if SSB meets criteria (C,D,E);
- 2 person (poll) support deferring if action has already been initiated in response to another trigger (F)

Recreational Release Mortality

Seasonal Closures

- 4 people (poll) support statewide no-targeting closures for 2 weeks (B1)
- 5 people (poll) support no-harvest spawning area closures for January-April (B2-a)
- 5 people (poll) support no-targeting spawning ground closures for 2 weeks (B2-b)
- 4 people, including NEBHA, noted concerns about no-targeting closure options, particularly B1, due to lack of data to quantify the benefit of closures, enforcement concerns, and that New Hampshire and Maine have favorable water conditions for survival (does not have the same warm water concerns as other states)

Gear Restrictions

- 17 people (poll) support prohibiting devices other than non-lethal devices for removing striped bass from the water (C1), including NEBHA
- 13 people (poll) support requiring the release of incidentally caught striped bass on any unapproved method of take (C2), including NEBHA

Outreach/Education

- 2 people, including NEBHA, noted support for recommended outreach (D2) with comments of not wanting to interfere with agency resources by implementing required outreach

Rebuilding Plan

- 1 people (poll) support the standard recruitment method (A) for the 2022 assessment
- 17 people (poll) support the low recruitment assumption (B) for the 2022 assessment, including NEBHA
- 3 people (poll) support the status quo addendum process (A)
- 13 people (poll) support the faster Board action process (B), including NEBHA, with comments that the addendum process is too slow and the Board should take action to get things done quickly

Conservation Equivalency

- 1 (poll) supports status quo Board discretion on CE (A)
- 10 people (poll) support stock status CE restrictions (B)
    - 2 people noted support for B1-a: no CE if the stock is overfished, including NEBHA, with comments on rebuilding should take priority over flexibility
- 7 people (poll) support MRIP PSE standards (C) for CE proposals
    - 2 people noted support for C3: 30 PSE limit, including NEBHA
- 7 people (poll) support CE uncertainty buffers (D)
    - 2 people noted support for D2: 25% buffer, including NEBHA
- 7 people (poll) support defining equivalency (E) for CE proposals
    - 2 people noted support for E2: equivalency to state-specific projection, including NEBHA

General Comments:

- Support for acting urgently to improve the stock and maintain abundance in the future after years of past mismanagement, and managing for the best interest of the species
- Concern the Board is not looking at the impact of the commercial sector, including concern about commercial nets
- 2 people noted support for making striped bass a gamefish
- 1 person noted the recruitment metric used for striped bass is not an accurate method
- 1 person noted concern about lack of monitoring for standard unit per effort for the Maryland trophy fishery (and not accounting for the trophy fishery catching pre-spawn females with eggs) and concern about striped bass mortality in pound nets
- 1 person noted the need to focus on bait fish

Attendance

- *Attendee list (webinar) and sign-in sheet (in-person) attached separately*
- *Additional ME state staff: Kevin Sullivan, Rebecca Heuss*

Massachusetts Public Hearing
Striped Bass Draft Amendment 7
March 21, 2022 – Webinar

Public Attendees: 91
Hearing Officers: Mike Armstrong (MA DMF)
ASMFC Staff: Emilie Franke, Toni Kerns

MA Management Board/Proxies in attendance:
Mike Armstrong, Ray Kane, Dan McKiernan

Polls/Commenters:	
MA	48
ME	2
NH	4
RI	1
CT	2
NY	1
MD	3
DC	1

62 attendees provided comments/participated in virtual polls, including comments on behalf of the Cape Cod Charter Boat Association (CCCBA), New England Chapter of Backcountry Hunters and Anglers (NEBHA)

Management Triggers

- General comment to maintain status quo triggers and to not put management before the science; management should react to the science

Tier 1: F Triggers

- 34 people (poll) support reducing F to the target within 1 year (A1)
- 10 (poll) supports reducing F to the target within 2 years (A2)
- 5 people support status quo F triggers (B1 and C1)

Tier 2: SSB Triggers

- 1 people support a 2-year deadline to implement a rebuilding plan (A2)
- 5 people support status quo SSB triggers (B1 and C1)

Tier 3: Recruitment Trigger

- 4 people support moderate sensitivity trigger (A2), including NEBHA, with a comment noting the importance of protecting year classes like the 2015s and 2017s before it's too late
- 4 people support the most conservative recruitment trigger response (B2), including NEBHA

Tier 4: Deferred Management Action

- 29 people (poll) support status quo no deferred management action (A)
- 6 people (poll) support deferring if it's been less than three years since the last action;
- 5 people supports deferring if SSB meets criteria (C,D,E);
- 5 people (poll) support deferring if action has already been initiated in response to another trigger (F)

Recreational Release Mortality

- Several people noted concern that these measures are not being considered for the commercial sector, and these types of restrictions should be implemented across all sectors support the stock

Seasonal Closures

- 8 people (poll) support statewide no-targeting closures for 2 weeks (B1)
- 29 people (poll) support no-harvest spawning area closures for January-April (B2-a)
- 26 people (poll) support no-targeting spawning ground closures for 2 weeks (B2-b)
- Several people, including CCCBA and NEBHA, noted opposition to B1 statewide no-targeting closure options due to lack of data to quantify the benefit of closures, enforcement concerns, and negative economic impacts to businesses
- CCCBA noted spawning closures are more palatable because it's only in particular areas and there is a specific reason to communicate to customers about the closures

Gear Restrictions

- 42 people (poll) support prohibiting devices other than non-lethal devices for removing striped bass from the water (C1)
- 35 people (poll) support requiring the release of incidentally caught striped bass on any unapproved method of take (C2)

Outreach/Education

- 4 people noted support for required outreach (D1) and the importance of outreach and education efforts
- 4 people, including NEBHA, noted support for recommended outreach (D2) with comments of not wanting to interfere with agency resources by implementing required outreach

Rebuilding Plan

- 8 people support the low recruitment assumption (B) for the 2022 assessment, including NEBHA
- 3 people support the status quo addendum process (A) with comments that the public comment process should not be eliminated and a new process should not be created before we know the assessment results
- 6 people support the faster Board action process (B), including NEBHA, with comments that the Board should act quickly if there is a need to respond

Conservation Equivalency

- General comments that CE has been misused to game the system and has been a loophole for special interest groups, and so the use of CE should be restricted
- 4 people support status quo Board discretion on CE (A) with comments that states should not be too restricted and the status quo approval process by the Board is sufficient

- 7 people support stock status CE restrictions (B)
    - 4 people, including NEBHA, noted support for B1-a: no CE if the stock is overfished
- 4 people support MRIP PSE standards (C) for CE proposals
    - 1 person noted support for C3: 30 PSE limit
- 4 people support CE uncertainty buffers (D)
    - 1 person noted support for D2: 25% buffer
- 7 people support defining equivalency (E) for CE proposals
    - 4 people, including NEBHA, noted support for E2: equivalency to state-specific projection

General Comments:

- Concern about the accuracy of MRIP data and if the data are flawed, how can one sector be targeted for restrictions
- Questions and concerns about the 9% recreational release mortality estimate being used in the stock assessment
- The complexity of the draft amendment makes providing public comment difficult and has dissuaded public engagement; the Board has no consensus on how they want management to look
- Management cannot come before the data; we don't know the assessment results yet and the impact of the 18% reduction
- Enforcement is difficult with so many people in the fishery
- Concern about climate change impact on mortality and environmental conditions contributing to spawning success, including bait availability and pollution (for example, the use of agricultural pesticides in the Chesapeake Bay and impact on striped bass recruitment and egg development
- Manage for abundance
- Need for management and industry workshops to get input from industry and get a better sense of the direction management is going

Attendance

- *Attendee list attached separately*
- *Additional ME state staff: Nichola Meserve, Gary Nelson, Matt Ayer, James Cullen, Bill Hoffman, Kristen Thiebault, Patrick Moran*

Rhode Island Public Hearing
Striped Bass Draft Amendment 7
March 15, 2022 – Webinar

Public Attendees: 31
Hearing Officers: Jason McNamee (RI DEM)
ASMFC Staff: Emilie Franke, Toni Kerns, Maya Drzewicki

RI Management Board/Proxies in attendance:
Jason McNamee

Polls/Commenters:	
RI	11
ME	3
NH	1
MA	4
CT	1
NY	2
NJ	1
MD	1
VA	1

25 attendees provided comments/participated in virtual polls, including comments on behalf of the Rhode Island Party and Charter Boat Association (RIPCBA), Rhode Island Saltwater Anglers Association (RISAA), Connecticut Catch and Release Fly Fishing Facebook Group (CTCR), New England Chapter of Backcountry Hunters and Anglers (NEBHA)

Management Triggers

- General comments on the need for conservative approaches and low-risk approaches

Tier 1: F Triggers

- 14 people (poll) support reducing F to the target within 1 year (A1), including RISAA and NEBHA, with a comment supporting responsive management triggers instead of extended deadlines for stability
- 1 RIPCBA (poll) supports reducing F to the target within 2 years (A2)
- 4 people support status quo F triggers (B1 and C1), including RISAA and NEBHA
- 1 RIPCBA supports a 2-year average for the F threshold trigger (B2) and no trigger for F target (C3)

Tier 2: SSB Triggers

- 5 people support a 2-year deadline to implement a rebuilding plan (A2), including RIPCBA, RISAA and NEBHA
- 5 people support status quo SSB threshold trigger (B1), including RIPCBA and RISAA
- 3 people supports status quo SSB target trigger (C1), including RISAA and NEBHA
- 1 RIPCBA supports no trigger for SSB target (C3)

Tier 3: Recruitment Trigger

- 4 people support moderate sensitivity trigger (A2), including RISAA and NEBHA, with comments on the importance of protecting remaining young fish and not missing opportunities to protect year classes like the 2015s and 2017s
- 1 RIPCBA supports the status quo flexible recruitment trigger response (B1)

- 4 people support the most conservative recruitment trigger response (B2), including NEBHA and RISAA

Tier 4: Deferred Management Action

- 13 people (poll) support status quo no deferred management action (A), including RISAA NEBHA, with comment that deferred management action is a hallmark of ineffective management
- 2 people (poll), including RIPCBA, support deferring if it's been less than three years since the last action (B);
- 1 person supports deferring if SSB meets criteria (C,D,E);
- 1 person (poll) supports deferring if action has already been initiated in response to another trigger (F)

Recreational Release Mortality

Seasonal Closures

- 2 people (poll) support statewide no-targeting closures for 2 weeks (B1) with comments noting how much recreational release mortality contributes to overall mortality and the need to do the fair share to recover the stock
- 5 people (poll) support no-harvest spawning area closures for January-April (B2-a)
- 4 people (poll) support no-targeting spawning ground closures for 2 weeks (B2-b) with comments that fish should be allowed to spawn successfully in order to rebuild
- 5 people, including NEBHA, noted opposition to closure options, particularly B1, due to lack of data to quantify the benefit of closures, uncertainty of when closures would take place in different states, and the negative impacts to tourism and visitors traveling to RI for fishing

Gear Restrictions

- 17 people (poll) support prohibiting devices other than non-lethal devices for removing striped bass from the water (C1), including RISAA and NEBHA
- 1 RIPCBA opposes C1 due to a hope of returning to a different set of size restrictions in the future that would allow larger fish to be harvested
- 12 people (poll) support requiring the release of incidentally caught striped bass on any unapproved method of take (C2), including RISAA and NEBHA

Outreach/Education

- 4 people noted support for required outreach (D1), including RIPCBA and CTCR, with comments noting the general public does not know how to properly handle striped bass
- 3 people, including NEBHA, noted support for recommended outreach (D2) due to not wanting to interfere with agency resources by implementing required outreach

Rebuilding Plan

- 3 people (poll) support the standard recruitment method (A) for the 2022 assessment

- 16 people (poll) support the low recruitment assumption (B) for the 2022 assessment, including RISAA, CTCR, and NEBHA
- 1 RIPCBA (poll) support the status quo addendum process (A)
- 17 people (poll) support the faster Board action process (B), including RISAA, CTCR, and NEBHA, with comments the Board should act as quickly as possible and focus on rebuilding as the priority

Conservation Equivalency

- 1 RIPCBA (poll) supports status quo Board discretion on CE (A) because the Board should have as much flexibility as possible
- 14 people (poll) support stock status CE restrictions (B)
    - 5 people noted support for B1-a: no CE if the stock is overfished, including RISAA, CTCR, and NEBHA, with comments on rebuilding being prioritized over regional needs and CE being abused in the past
    - 2 noted support for B1-c: no CE if overfishing is occurring
    - 1 person noted support for B2-a: stock status restrictions should apply to Hudson River, Delaware Bay/River fisheries
- 6 people (poll) support MRIP PSE standards (C) for CE proposals
    - 5 people noted support for C3: 30 PSE limit, including RISAA, CTCR, and NEBHA, with comments this is the accepted standard
    - RIPCBA is opposed to option C because MRIP already will not be publishing data with PSE above 50
- 8 people (poll) support CE uncertainty buffers (D)
    - 1 RISAA noted support for D1: 10% buffer
    - 4 people noted support for D2: 25% buffer, including CTCR
    - NEBHA noted support for D2 as long as B stock status restrictions are selected; if stock status restrictions are not selected, they would support a larger buffer D3
- 6 people (poll) support defining equivalency (E) for CE proposals
    - 2 people noted support for E2: equivalency to state-specific projection, including NEBHA

General Comments:

- Complexity of the document limits comments from the public and the importance of organizations in submitting comments on behalf of members
- Disturbing trend of managing for abundance and how that does not align with ecosystem management; also notes concern about declining trend of harvested fish and increased release mortality when striped bass is a valuable source of food; disappointed there are no measures considered to protect age-8 and age-9 fish that are spawning

- Desire to see greater spawning stock in the future and stronger triggers so overfishing does not happen again with a recovered stock as soon as possible and abundance for the future
- Support managing for abundance
- Management should consider changing the slot based on various year classes, especially with the 2017 year class entering the slot soon; should not repeat the loss of the 2011 year class due to CE
- What drives the fishery is having more fish in the water for everyone to use (catch, eat, release) and recreational anglers want the opportunity to catch fish
- There are a lot of people targeting striped bass and accountability for recreational fishermen is critical to address these issues
- Concern about accuracy of MRIP data
- Limit the number of fish that can be caught per day
- All user groups should have equal access and decisions should not be rushed that could negatively impact users

Attendance

- *Attendee list attached separately*
- *Additional RI state staff: Nicole Lengyel Costa, Kurt Blanchard, John Lake*

Connecticut Public Hearing
Striped Bass Draft Amendment 7
March 22, 2022 – Webinar

Public Attendees: 39
Hearing Officers: Justin Davis (CTDEEP)
ASMFC Staff: Emilie Franke, Toni Kerns

CT Management Board/Proxies in attendance:
Justin Davis, Bill Hyatt, Sen. Craig Miner

Polls/Commenters:	
CT	22
ME	2
MA	1
NY	3
MD	1

29 attendees provided comments/participated in virtual polls, including comments on behalf of the New England Chapter of Backcountry Hunters and Anglers (NEBHA)

Management Triggers

- General comments on the need for conservative approaches and low-risk approaches

Tier 1: F Triggers

- 16 people (poll) support reducing F to the target within 1 year (A1), including NEBHA, with comments on past Board failure to take reductions in a timely manner and the need for timely action
- 1 person (poll) supports reducing F to the target within 2 years (A2)
- 3 people support status quo F triggers (B1 and C1), including NEBHA

Tier 2: SSB Triggers

- 3 people support a 2-year deadline to implement a rebuilding plan (A2), including NEBHA
- 2 people support status quo SSB threshold trigger (B1)
- 1 person supports status quo SSB target trigger (C1)
- 1 person supports decoupling SSB from F for the SSB target trigger (C2) to address downward trends before overfished status is reached

Tier 3: Recruitment Trigger

- 2 people support moderate sensitivity trigger (A2), including NEBHA, with comments on the importance of protecting remaining young fish and not missing opportunities to protect year classes; missed opportunity to protect the 2015 year class
- 1 person supports high sensitivity trigger (A3)
- 3 people support the most conservative management response (B2), including NEBHA

Tier 4: Deferred Management Action

- 12 people (poll) support status quo no deferred management action (A), including NEBHA, with comment that deferred management action is a hallmark of ineffective management
- 1 person (poll) supports deferring if SSB meets criteria (C,D,E)
- 4 people (poll) support deferring if action has already been initiated in response to another trigger (F)

Recreational Release Mortality

Seasonal Closures

- 3 people (poll) support statewide no-targeting closures for 2 weeks (B1)
- 12 people (poll) support no-harvest spawning area closures for January-April (B2-a)
- 14 people (poll) support no-targeting spawning ground closures for 2 weeks (B2-b) with comments that fish should be allowed to spawn successfully in order to rebuild
- NEBHA noted opposition to all closure options due to lack of data to quantify the benefit of closures and difficulty to enforce
- 1 person noted concern about release mortality in the winter Housatonic River fishery and would support a closure for that fishery in the winter

Gear Restrictions

- 20 people (poll) support prohibiting devices other than non-lethal devices for removing striped bass from the water (C1), including NEBHA
- 14 people (poll) support requiring the release of incidentally caught striped bass on any unapproved method of take (C2), including NEBHA

Outreach/Education

- NEBHA noted support for recommended outreach (D2) due to not wanting to interfere with agency resources by implementing required outreach

Rebuilding Plan

- 3 people (poll) support the standard recruitment method (A) for the 2022 assessment
- 18 people (poll) support the low recruitment assumption (B) for the 2022 assessment, including NEBHA, with comments on the low YOY data and the need to be risk-averse
- 3 people (poll) support the status quo addendum process (A)
- 19 people (poll) support the faster Board action process (B), including NEBHA, with comments the Board should act as quickly as possible to avoid worsening the situation and the Board has a past legacy of delaying action

Conservation Equivalency

- 3 people (poll) support status quo Board discretion on CE (A)
- 17 people (poll) support stock status CE restrictions (B)

    - 4 people noted support for B1-a: no CE if the stock is overfished, including NEBHA, with comments on rebuilding being prioritized over flexibility
- 12 people (poll) support MRIP PSE standards (C) for CE proposals
    - 4 people noted support for C3: 30 PSE limit, including NEBHA, with comments this is the accepted standard
- 12 people (poll) support CE uncertainty buffers (D)
    - 3 people noted support for D2: 25% buffer
    - 1 person noted support for D3: 50% buffer
    - NEBHA noted support for D2 as long as B stock status restrictions are selected; if stock status restrictions are not selected, they would support a larger buffer D3
- 12 people (poll) support defining equivalency (E) for CE proposals
    - 4 people noted support for E2: equivalency to state-specific projection, including NEBHA
- General comment on the increased risk, low predictability, and high uncertainty of CE

General Comments:

- Priority should be striped bass abundance recovering as soon as possible to previous abundance levels
- Managing striped bass for abundance benefits all stakeholders over the long term
- For-hire fleet wants to keep the measures at the current slot and keep everything status quo; we already exceeded the expectations of the percent reduction from the Addendum VI slot
- There needs to be an urgency to take action to rebuild as quickly as possible
- Need to address and account for the importance of menhaden in the Chesapeake Bay, especially during the spawning season, and co-manage menhaden and striped bass; concern about Omega Protein menhaden harvest

Attendance

- *Attendee list attached separately*
- *Additional CT state staff: David Molnar, Joshua Tefft, Todd Chemacki, Michael Humphreys*

New York (Kings Park) Public Hearing
Striped Bass Draft Amendment 7
March 16, 2022 – Kings Park, NY

Note: NY DEC livestreamed the public hearing with virtual attendees in listen-only mode.

Public Attendees: 36
Hearing Officers: Jim Gilmore (NYSDEC)
ASMFC Staff: Emilie Franke
NY state staff: John Maniscalco, Stephanie Rekemeyer, Jesse Hornstein, Maureen Davidson

NY Management Board/Proxies in attendance:
Jim Gilmore, John McMurray, Emerson Hasbrouck (virtual), Maureen Davidson

Polls/Commenters:	
NY	36

36 attendees provided comments/participated in show of hands, including comments on behalf of the NY Coalition for Recreational Fishing (NYCRF) and New York Chapter of Backcountry Hunters and Anglers (NYBHA)

Management Triggers

Tier 1: F Triggers

- 31 people (vote) support reducing F to the target within 1 year (A1), including NYCRF and NYBHA, with comments to not delay action
- 5 people (vote) support reducing F to the target within 2 years (A2)
- 6 people support status quo F threshold trigger (B1) and 5 people support the status quo F target trigger (C1)

Tier 2: SSB Triggers

- 4 people support a 2-year deadline to implement a rebuilding plan (A2)
- 6 people support status quo SSB threshold trigger (B1)
- 5 people supports status quo SSB target trigger (C1)

Tier 3: Recruitment Trigger

- 2 people support moderate sensitivity trigger (A2), including NYBHA
- 1 NYCRF supports the high sensitivity trigger (A3), including NYCRF
- 5 people support the most conservative recruitment trigger response (B2), including NYCRF and NYBHA

Tier 4: Deferred Management Action

- 28 people (vote) support status quo no deferred management action (A), including NYCRF and NYBHA, with comments to minimize delay and require prompt action
- 6 people (vote) support deferring if it's been less than three years since the last action;
- 6 people (vote) support deferring if SSB meets criteria (C,D,E);

- 6 people (vote) support deferring if action has already been initiated in response to another trigger (F)

Recreational Release Mortality

- General comments that these proposed measures weaponize release mortality and the source of fishing mortality does not matter; inappropriate to single out catch and release fisheries and reductions should occur across all sectors; the fishery is primarily recreational so some level of release mortality needs to be accepted
- Concern that the benefit of the proposed measures cannot be quantified

Seasonal Closures

- Some comments in opposition to seasonal closures, including NYCRF and NYBHA, due to enforcement concerns and concern about targeting the recreational sector

Gear Restrictions

- 3 people support prohibiting devices other than non-lethal devices for removing striped bass from the water (C1)
- 3 people support requiring the release of incidentally caught striped bass on any unapproved method of take (C2)

Outreach/Education

- 2 people noted support for required outreach (D1)
- 1 person noted support for recommended outreach (D2)

Rebuilding Plan

- 3 people support the low recruitment assumption (B) for the 2022 assessment, including NYCRF and NYBHA
- 5 people support the faster Board action process (B), including NYCRF and NYBHA, with comments noting action to rebuild the stock as quickly as possible

Conservation Equivalency

- 3 people support stock status CE restrictions (B) with comments noting past failure of CE programs in other states
    - 3 people noted support for B1-a: no CE if the stock is overfished
    - 1 noted support for B1-c: no CE if overfishing is occurring
    - 1 person noted support for B2-b: stock status restrictions should apply to recreational bonus programs
- 2 people support MRIP PSE standards (C) for CE proposals
    - 2 people noted support for C3: 30 PSE limit
- 2 people support CE uncertainty buffers (D)
    - 4 people noted support for D2: 25% buffer, including CTCR
- 3 people support defining equivalency (E) for CE proposals
    - 3 people noted support for E2: equivalency to state-specific projection

General Comments:

- Concern about the quality of MRIP data and questions about the accuracy and appropriateness of the 9% recreational release mortality estimate
- Complexity of the document makes it difficult to provide public comment and public trust has been eroding
- Desire for broad age structure and increased abundance of all size classes
- Need more enforcement and budget to support increased enforcement presence
- Support for conservative approach to rebuild the stock as soon as possible with no delays and minimize risk
- Rebuild as soon as possible in less than 10 years so we can experience good fishing sooner
- 1 person noted declines in local waters and smaller fish, while another noted large numbers of striped bass, especially in the summer
- The charter industry has already taken reductions and cannot go any lower than 1 fish bag limit; the charter industry is not discarding and emphasizes the value in keeping the fish
- Environmental impacts, like pollution and sewage, should be accounted for

Attendance

- *Attendee sign-in sheet attached separately*

New York (New Paltz) Public Hearing
Striped Bass Draft Amendment 7
March 23, 2022 – New Paltz, NY

Note: NY DEC livestreamed the public hearing with virtual attendees in listen-only mode.

Public Attendees: 46
Hearing Officers: John Maniscalco (NYSDEC)
NY DEC Staff: Jessica Best, Gregg Kenney, Stephanie Mossey, Stephanie Rekemeyer, Wendy Rosenbach, ElizaBeth Streifeneder

NY Management Board/Proxies in attendance:
Virtual: James Gilmore (NYSDEC), Emerson Hasbrouck, John McMurray, Maureen Davidson (NYSDEC); In-person Jesse Hornstein (NYSDEC)

Polls/Commenters:	
NY	40

40 attendees provided comments/participated show of hands

Management Triggers
Tier 1: F Triggers

- 11 people (vote) support reducing F to the target within 1 year (A1)
- 22 (vote) supports reducing F to the target within 2 years (A2)

Tier 4: Deferred Management Action

- 2 people (vote) support status quo no deferred management action (A)
- 13 people (vote) support deferring if SSB meets criteria (C,D,E);
- 1 person (vote) supports deferring if action has already been initiated in response to another trigger (F)

Recreational Release Mortality
Seasonal Closures

- No support (vote) for statewide no-targeting closures for 2 weeks (B1)
- 2 people (vote) support spawning area and/or spawning ground closures (B2-a/B2-b)
- General opposition to closures in the Hudson with comments noting the success of the current slot in recovering the stock, and the negative economic impacts of closing the season
- 1 person noted it would be impossible to determine closures based on water temperatures due to temperature variation throughout the day and by location

Gear Restrictions

- 39 people (vote) support prohibiting devices other than non-lethal devices for removing striped bass from the water (C1)

- 39 people (vote) support requiring the release of incidentally caught striped bass on any unapproved method of take (C2)
- 1 person supports reducing the allowed rods per person and 1 person noted requiring barbless hooks and limiting the use of treble hooks as alternative approaches to seasonal closures

Outreach/Education

- 4 people noted support for required outreach (D1) with comments noting the importance of this strategy and a suggestion to develop materials like online videos

Rebuilding Plan

- 36 people (vote) support the standard recruitment method (A) for the 2022 assessment
- 3 people (vote) support the low recruitment assumption (B) for the 2022 assessment
- 37 people (vote) support the status quo addendum process (A)
- 3 people (vote) support the faster Board action process (B)

Conservation Equivalency

- 32 (vote) supports status quo Board discretion on CE (A)
- 1 person (vote) supports CE restrictions (B, C, D, E)

General Comments:

- 7 people commented in support of making striped bass a gamefish and eliminating commercial harvest
- Several comments in support of a universal 18-28" slot limit along the coast to protect the large spawning fish, which has been very successful in the Hudson
- Concern and questions about the accuracy of the 9% release mortality estimate, and support for new state-specific mortality studies
- Comments noted the issue with the stock is not in the Hudson, but there are problems in the ocean and in the Chesapeake Bay; fishing in the Hudson has been great and large fish are starting to come back
- There is a need for more enforcement and additional budget for officers
- Seeing positive results from the Hudson River cooperative angler program
- Need flexibility with certain measures given the differences between areas, like considering differences between the Hudson and the Chesapeake

Attendance

- *Attendee sign-in sheet attached separately*

New Jersey-Pennsylvania Public Hearing
Striped Bass Draft Amendment 7
March 14, 2022 – Webinar

Public Attendees: 88
Hearing Officers: Joe Cimino (NJDEP) and Kris Kuhn (PFBC)
ASMFC Staff: Emilie Franke, Toni Kerns, Savannah Lewis

NJ-PA Management Board/Proxies in attendance:
NJ – Joe Cimino, Tome Fote; PA – Kris Kuhn, Loren Lustig, Warren Elliott

78 attendees provided comments/participated in virtual polls, including comments on behalf of the Recreational Fishing Alliance (RFA)

Polls/Commenters:	
NJ	62
PA	7
ME	2
MA	1
NY	2
DE	2
MD	2

Management Triggers

- General comments on the need for conservative approaches and low-risk approaches
- RFA noted the importance of flexibility when responding to management triggers and that we should not be as reactive as some other fisheries

Tier 1: F Triggers

- 25 people (poll) support reducing F to the target within 1 year (A1)
- 18 people (poll) support reducing F to the target within 2 years (A2)

Tier 4: Deferred Management Action

- 31 people (poll) support status quo no deferred management action (A)
- 7 people (poll) support deferring if it's been less than three years since the last action (B);
- 9 people support deferring if SSB meets criteria (C,D,E);
- 8 people (poll) support deferring if action has already been initiated in response to another trigger (F)

Recreational Release Mortality

- Overall concern these types of restrictions are not being considered for the commercial sector

Seasonal Closures

- 6 people (poll) support statewide no-targeting closures for 2 weeks (B1) with comments noting how much recreational release mortality contributes to overall mortality and the need to do the fair share to recover the stock
- 25 people (poll) support no-harvest spawning area closures for January-April (B2-a) with comments noting increasing the value of the catch and release fishery and limiting harvest

- 19 people (poll) support no-targeting spawning ground closures for 2 weeks (B2-b) with comments that fish should be allowed to spawn successfully in order to rebuild
- Several people noted opposition to closure options, particularly B1, due to lack of data to quantify the benefit of closures, enforcement concerns, and the negative economic impacts of closing the season
- 1 person noted that a closure in Raritan Bay for two weeks would be beneficial to the stock

Gear Restrictions

- 55 people (poll) support prohibiting devices other than non-lethal devices for removing striped bass from the water (C1)
- 30 people (poll) support requiring the release of incidentally caught striped bass on any unapproved method of take (C2)
- 1 person noted support for not allowing catch and release due to the high release mortality level; there would be a 1-fish bag limit and would be illegal to release

Outreach/Education

- 3 people noted support for required outreach (D1) with comments noting the importance of this approach, as compared to the other types of options that would impose restrictions, and the potential for a required education class to target striped bass
- 1 person noted support for recommended outreach (D2) due to not wanting to interfere with agency resources by implementing required outreach

Rebuilding Plan

- 26 people (poll) support the standard recruitment method (A) for the 2022 assessment
- 29 people (poll) support the low recruitment assumption (B) for the 2022 assessment
- 20 people (poll) support the status quo addendum process (A)
- 30 people (poll) support the faster Board action process (B) with comments the Board should act as quickly as possible and focus on rebuilding as the priority
- 1 person noted the importance of waiting until we know the results of the 2022 assessment before deciding how to proceed

Conservation Equivalency

- 20 people (poll) supports status quo Board discretion on CE (A) because the Board should have as much flexibility as possible
- 21 people (poll) support stock status CE restrictions (B)
- 9 people (poll) support MRIP PSE standards (C) for CE proposals
- 12 people (poll) support CE uncertainty buffers (D)
- 10 people (poll) support defining equivalency (E) for CE proposals

General Comments:

- Concern about the accuracy of MRIP data; there is a need for better data and additional data (like the NJ tag data) should be considered to supplement MRIP estimates
- Need for more enforcement and concern about poaching
- Questions about the 9% recreational release mortality estimate and whether it is representative
- Concern that restrictions are focused on the recreational sector that has already taken large reductions
- If the stock does do well, there needs to be assurances of a possible liberalization of restrictions in the future
- Spawning stock in the Chesapeake Bay has declined and that should be the focus; stock is also moving north and out into the EEZ
- There is value in the harvest of striped bass as well as the catch and release
- 1 person recommended adding a stocking program to the draft amendment

Attendance

- *Attendee list attached separately*
- *Additional NJ state staff: Linda Barry, Jeff Brust, Brendan Harrison, Mike Celestino, Heather Corbett, Samantha Macquesten*
- *Additional PA state staff: Tyler Grabowski, Mike Porta, David Nihart*

Delaware Public Hearing
Striped Bass Draft Amendment 7
March 10, 2022 – Webinar

Public Attendees: 19
Hearing Officers: John Clark
ASMFC Staff: Emilie Franke, Savannah Lewis, Tracey Bauer

DE Management Board/Proxies in attendance:
John Clark, Roy Miller

14 attendees provided comments/participated in virtual polls, including comments on behalf of the American Saltwater Guides Association (ASGA)

Polls/Commenters:	
DE	6
ME	1
MA	1
CT	1
NJ	2
MD	2
VA	1

Management Triggers

Tier 1: F Triggers

- 7 people (poll) support reducing F to the target within 1 year (A1)
- 5 people (poll) support reducing F to the target within 2 years (A2)

Tier 4: Deferred Management Action

- 8 people (poll) support status quo no deferred management action (A)
- 3 people (poll) support deferring if it's been less than three years since the last action (B);
- 2 people support deferring if SSB meets criteria (C,D,E);
- 2 people (poll) supports deferring if action has already been initiated in response to another trigger (F)

Recreational Release Mortality

- 2 people noted concern that seasonal closures are not being considered for the commercial sector

Seasonal Closures

- 1 person (poll) support statewide no-targeting closures for 2 weeks (B1)
- 9 people (poll) support no-harvest spawning area closures for January-April (B2-a)
- 5 people (poll) support no-targeting spawning ground closures for 2 weeks (B2-b)

Gear Restrictions

- 9 people (poll) support prohibiting devices other than non-lethal devices for removing striped bass from the water (C1)
- 7 people (poll) support requiring the release of incidentally caught striped bass on any unapproved method of take (C2)

Rebuilding Plan

- 4 people (poll) support the standard recruitment method (A) for the 2022 assessment
- 5 people (poll) support the low recruitment assumption (B) for the 2022 assessment
- 4 people (poll) support the status quo addendum process (A)
- 5 people (poll) support the faster Board action process (B)

Conservation Equivalency

- 4 people (poll) supports status quo Board discretion on CE (A)
- 8 people (poll) support stock status CE restrictions (B)
    - 2 people, including ASGA, support B2-a: no CE if the stock is overfished with a comment on not making the situation worse with CE when the stock is overfished
- 5 people (poll) support MRIP PSE standards (C) for CE proposals
    - 2 people, including ASGA, support C3: MRIP PSE limit of 30
- 6 people (poll) support CE uncertainty buffers (D)
    - 2 people, including ASGA, support D2: 10% uncertainty buffer
- 6 people (poll) support defining equivalency (E) for CE proposals
    - 2 people, including ASGA, support E2: CE programs equivalent to state-specific projection with a comment on states not taking a high enough reduction in the past

Attendance

- *Attendee list attached separately*
- *Additional DE state staff: Michael Stangl, David Stormer, Jordan Zimmerman*

Maryland Public Hearing
Striped Bass Draft Amendment 7
March 28, 2022 – Webinar

Public Attendees: 72
Hearing Officers: Mike Luisi (MDDNR)
ASMFC Staff: Emilie Franke, Toni Kerns

MD Management Board/Proxies in attendance:
Mike Luisi, David Sikorski

Polls/Commenters:	
MD	42
ME	1
NH	1
CT	1
NY	4
DE	1
VA	4
FL	1

55 attendees provided comments/participated in virtual polls, including comments on behalf of the Maryland Charter Boat Association (MCBA), Kent County fishermen, Annapolis Anglers Club (AAC), and the Chesapeake Bay Foundation (CBF)

Management Triggers

- General support for developing state- and/or sector-specific mortality rates to determine state- or region-specific management

Tier 1: F Triggers

- 29 people (poll) support reducing F to the target within 1 year (A1)
- 10 people (poll) support reducing F to the target within 2 years (A2)

Tier 4: Deferred Management Action

- 20 people (poll) support status quo no deferred management action (A)
- 7 people (poll) support deferring if it's been less than three years since the last action (B)
- 8 people support deferring if SSB meets criteria (C,D,E)
- 8 people (poll) supports deferring if action has already been initiated in response to another trigger (F)

Recreational Release Mortality

- Overall concern these types of restrictions are not being considered for the commercial sector
- Concern that for-hire is in the same category as private recreational anglers; for-hire have a lower mortality rate as professional fishermen

Seasonal Closures

- 18 people (poll) support statewide no-targeting closures for 2 weeks (B1)
    - Some people, including CBF, noted that longer closures should be considered based on water quality and environmental conditions, and the impacts of mid-water heating and loss of habitat should be considered

- 36 people (poll) support no-harvest spawning area closures for January-April (B2-a)
- 15 people (poll) support no-targeting spawning ground closures for 2 weeks (B2-b)
- Some people noted opposition to no-targeting closure options due to enforcement concerns

Gear Restrictions

- 39 people (poll) support prohibiting devices other than non-lethal devices for removing striped bass from the water (C1)
- 24 people (poll) support requiring the release of incidentally caught striped bass on any unapproved method of take (C2)
- 1 person noted support for limiting the number of rods per person, 1 person supports requiring in-water release of fish in the summer, and 2 people support requiring barbless hooks

Outreach/Education

- 5 people noted support for required outreach (D1) with comments noting the importance of educating new anglers with good catch and release methods, and this requirement would ensure states have budgets to conduct the outreach; one suggestion for a requirement on education in order to get your license

Rebuilding Plan

- 19 people (poll) support the standard recruitment method (A) for the 2022 assessment
- 22 people (poll) support the low recruitment assumption (B) for the 2022 assessment
- 21 people (poll) support the status quo addendum process (A) with comments noting maintaining the public comment period as opposed to limiting comment in B
- 21 people (poll) support the faster Board action process (B), including CBF, with comments the Board should act as quickly as possible and focus on rebuilding the stock and act quickly to avoid a moratorium and to avoid delays in action

Conservation Equivalency

- 7 people (poll) supports status quo Board discretion on CE (A), including MCBA, because the Chesapeake Bay is a very different fishery than the coast, and CE allows the Bay to reduce discards by changing the size limit; the charter industry provides in-depth data to support CE and measures are based on the data and what is happening on the water
- 15 people (poll) support stock status CE restrictions (B)
- 13 people (poll) support MRIP PSE standards (C) for CE proposals
- 13 people (poll) support CE uncertainty buffers (D)
- 4 people (poll) support defining equivalency (E) for CE proposals
- 2 people noted concern about the data and assumptions used for CE programs and the need for restrictions on CE, as well as concern about the current Maryland CE program that while it limits effort in the summer, it enables targeting of large spawning fish in the spring

- 1 person noted the need for accountability for CE programs to address concerns

General Comments:

- Concern and questions about the 9% recreational release mortality estimate and concerns that the estimate is very outdated; this does not represent what the industry is seeing on the water and there should be a new study conducted; it is not appropriate to use this study and new studies should be conducted on a smaller geographic scale to have new, better science to inform management
- Need to be conservative while preserving the opportunity to go fishing
- 2 people support limiting harvest of spawning fish by implementing a maximum size limit during the trophy season and/or limit the number of fish per boat
- AAC and CBF noted the need for conservative action to rebuild the stock as quickly as possible
- 2 people noted concern about menhaden harvest in the Bay and the need to consider prohibiting all menhaden harvest
- General support for the use of slot limits
- The Kent County fishermen representative noted questions about the stock assessment numbers based on reporting that striped bass have not declined and 2021 gill nets and pound nets saw record numbers of fish with less effort required to catch the fish; seeing larger and more fish in the Bay and also multiple stocks of fish from along the coast

Attendance

- *Attendee list attached separately*
- *Additional MD state staff: Alexei Sharov, Simon Brown, Lynn Fegley, Paul Genovese, Erik Zlokovitz, Harry Hornick, Beth Versak, Jeff Horne, Marilyn Lash, George O'Donnell, Angel Willey*

Potomac River Fisheries Commission and District of Columbia Public Hearing
Striped Bass Draft Amendment 7
March 8, 2022 – Colonial Beach, VA

Public Attendees: 14
Hearing Officers: Marty Gary (PRFC) and Daniel Ryan (DC)
ASMFC Staff: Emilie Franke

Commenters from:	
MD/VA	14

Management Board/Proxies in attendance:
Marty Gary (PRFC), Daniel Ryan (DC)

14 attendees provided comments/participated in a show of hands, including comments on behalf of the Maryland Waterman's Association (MWA)

Management Triggers

- 1 person indicated support for taking action more gradually (Tier 1 A2) and letting management be in place a longer time before making changes (Tier 4 B); there has been too much action too fast and the Addendum VI reductions have only been in place for 2 years
- 1 person noted concern about setting the reference point goals too high and they cannot be met; the goals need to lowered to a reasonable condition and we are seeing the condition of more fish available (catching more fish with less effort)
- There was a recommendation to separate commercial and recreational mortality rates in future stock assessments

Recreational Release Mortality

Seasonal Closures

- 1 person noted there are alternate species present in the Bay during the summer so it's not a big deal to have a closure since there are other species to target in the Bay
- 1 person noted that if there are closures, all states should have similar closure requirements
- Multiple people noted that the summer closures are effective in the Potomac and there have been fewer observations of floating, dead fish during the closures

Gear Restrictions

- 1 person noted opposition to the incidental catch requirement (C2); you should not have to release an incidentally caught fish, as long as it's in the legal season and size limit, since it has already suffered due to the gear interaction

General Release Mortality

- 3 people noted releases are increased due to higher size limits (20" minimum as compared to 18" minimum); when the size limit is increased, we have to handle more fish to find one within the size limit, so an 18" size limit would be a better option to reduce releases
- There was discussion about PRFC's decision for Addendum VI conservation equivalency to increase to the 20" minimum size and take a summer closure in order to have a 2-fish bag limit

Rebuilding Plan

- 3 people, including MWA, support using Option A. standard recruitment method for the 2022 stock assessment for the following reasons:
    - It only takes one it only takes one good year class to give us plenty of fish and high year classes will carry the stock
    - Successful spawning and recruitment are driven by environmental factors
    - Variation is natural and it's not unusual to have low years and high years for recruitment, and we are seeing a strong stock in the Potomac with the volume of fish steady and increasing
- 1 person supports the status quo addendum process to respond to the 2022 assessment (Option A) because there should be enough time for a thorough analysis of why the stock is low and to take into account an additional year (2022) under the Addendum VI reductions
- 1 person supports the faster Board action process (Option B) to respond to the assessment to allow for an immediate response to a problem

Conservation Equivalency

- 14 people (unanimous show of hands vote) support status quo Board discretion on CE (Option A) for the following reasons:
    - CE is a tool that must remain accessible since it provides the ability to conserve the resource through CE but maintain economic benefit, which is a win-win for the fish and the fishermen
    - CE for the recreational sector is important with support for the summertime closure because it works and allows them to fish at other times of year; benefits the fish by closing during the warm temperatures and benefits the fishermen
    - CE allows the ability to tweak regulations to better protect the fish (like not fishing on spawners); we are here to have a healthy stock of fish and we want to fish as many as we comfortably can and still have fish for the next generation

General Comments:

- 14 people (unanimous show of hands vote) support comments that the PRFC commercial sector is more accountable than other jurisdictions:
    - PRFC has a weekly reporting system, tags to trace fish back to harvester, and check-in stations;
    - Commercial removals are only 10% of total removals and it is unfair to the commercial sector to take an equal reduction if only removing less than 10% of striped bass, although the commercial sector should carry his weight;
    - Imperative to separate commercial and recreational sectors due to the data differences: you can get commercial data any time and there are no uncertainties to how many fish are removed by commercial harvesters; PRFC has been under the commercial quota in every year except one year;
    - Commercial sector is fishing on a smaller fish (5-7 pounds), and this is a win-win because 90% are male so there is no strain on spawning fish;
    - Commercial harvesters we are food producers producing top quality fish and need stay in business and have the data to support that
- Concern about invasive blue catfish predation on striped bass and the effect on the spawning stock in the Chesapeake Bay, which should be taken into account
- Virginia should have the same recreational reporting system as Maryland, which is much more detailed
- Climate change may be impacting where spawning occurs, with more spawning in northern areas that are no longer iced over

Attendance

- *Sign-in sheet attached separately*

Virginia Public Hearing
Striped Bass Draft Amendment 7
March 9, 2022 – Webinar

Public Attendees: 42
Hearing Officers: Pat Geer (VMRC)
ASMFC Staff: Emilie Franke, Maya Drzewicki

VA Management Board/Proxies in attendance: Pat Geer

Polls/Commenters:	
VA	18
ME	2
MA	2
CT	2
NJ	1
MD	2
NC	1

28 attendees provided comments/participated in virtual polls, including comments on behalf of the Virginia Saltwater Sportfishing Association (VSSA), commercial watermen (represented by attorney), Virginia Anglers Club (VAC), and Chesapeake Bay Foundation (CBF)

Management Triggers

- 4 people supported taking immediate action to address the stock
- 2 people, including for commercial watermen, noted the need for flexibility and reasonable time to make decisions

Tier 1: F Triggers

- 4 people support reducing F to the target within 1 year (A1), including VSSA and VAC, with comments in support of taking immediate action
- 2 people support reducing F to the target within 2 years (A2)
- 4 people support status quo F triggers (B1 and C1), including VSSA and VAC

Tier 2: SSB Triggers

- 4 people support a 2-year deadline to implement a rebuilding plan (A2), including VSSA and VAC
- 4 people support status quo SSB triggers (B1 and C1), including VSSA and VAC

Tier 3: Recruitment Trigger

- 4 people support moderate sensitivity trigger (A2), including VSSA and VAC
- 4 people support the most conservative recruitment trigger response (B2), including VSSA and VAC
- 1 person noted concerns about the use of juvenile abundance indices as a proxy for recruitment

Tier 4: Deferred Management Action

- 13 people (poll) support status quo no deferred management action (A), including VSSA, VAC, and CBF, with comments noting past management has acted too slowly and there cannot be deferred action while the stock is rebuilding
- 6 people (poll) support deferring if it's been less than three years since the last action (B);
- 4 people (poll) support deferring if SSB meets criteria (C,D,E);
- 3 person (poll) supports deferring if action has already been initiated in response to another trigger (F)

Recreational Release Mortality

- General comments that some states have higher release mortality than others and there is concern about release mortality during the warmer months in the Chesapeake
- Addressing recreational release mortality is a specific problem and restricting the commercial fishery will not help address this issue

Seasonal Closures

- 11 people (poll) support statewide no-targeting closures for 2 weeks (B1)
    - Some comments that a 2-week closure is inadequate and not long enough
- 18 people (poll) support no-harvest spawning area closures for January-April (B2-a), including VSSA and VAC
- 10 people (poll) support no-targeting spawning ground closures for 2 weeks (B2-b), including VSSA and VAC

Gear Restrictions

- 24 people (poll) support prohibiting devices other than non-lethal devices for removing striped bass from the water (C1), including VSSA and VAC
- 16 people (poll) support requiring the release of incidentally caught striped bass on any unapproved method of take (C2), including VSSA and VAC

Outreach/Education

- 5 people, including VSSA, VAC, and CBF, noted support for required outreach (D1)

Rebuilding Plan

- 10 people (poll) support the standard recruitment method (A) for the 2022 assessment
- 14 people (poll) support the low recruitment assumption (B) for the 2022 assessment, including VSSA, CBF, and VAC, with comments supporting a conservative approach to rebuild the fishery for ecological and economic value
- 8 people (poll) support the status quo addendum process (A)
- 13 people (poll) support the faster Board action process (B), including VSSA, CBF, and VAC, with comments that this is one of the most important components of the draft amendment and recovery should not be delayed
- General comments that the Board should keep in mind viability of fishing community when determining the rebuilding plan; there is a need for a healthy, robust fishery

Conservation Equivalency

- 7 (poll) supports status quo Board discretion on CE (A), including for the commercial watermen, with comments to maintain flexibility to address state-specific circumstances
- 15 people (poll) support stock status CE restrictions (B)
    - 11 people (poll) noted support for B1-a: no CE if the stock is overfished, including VSSA, VAC, and CBF
    - 3 people (poll) noted support for B1-b: no CE if SSB is below the target
    - 12 people (poll) noted support for B1-c: no CE if overfishing is occurring, including VSSA, VAC, and CBF, and VAC
    - 5 people (poll) support B2-a: stock status restrictions should also apply to the Hudson River and DE River/Bay recreational fisheries

    - 9 people (poll) support B2-b: stock status restrictions should also apply to recreational bonus programs, including VSSA and VAC,
    - 6 people (poll) support B2-c: stock status restrictions should also apply to commercial fisheries
- 13 people (poll) support MRIP PSE standards (C) for CE proposals
    - 1 person (poll) noted support for C1: 50 PSE limit
    - 12 people (poll) noted support for C3: 30 PSE limit, including VSSA and VAC
- 13 people (poll) support CE uncertainty buffers (D)
    - 2 people (poll) noted support for D1: 10% buffer
    - 7 people (poll) noted support for D2: 25% buffer, including VSSA and VAC
    - 4 people (poll) noted support for D3: 50% buffer
- 4 people (poll) support defining equivalency (E) for CE proposals
    - 4 people (poll) noted support for E2: equivalency to state-specific projection, including VSSA and VAC, including VSSA and VAC
- Some comments, including VSSA and VAC, in support of required payback the following year if CE assumptions are not met
- CBF noted CE has not functioned as intended, and should not be used during rebuilding
- Some comments, including for the commercial watermen, that CE is the only way to recognize differing circumstances in the different regions and different; any CE restrictions should be limited and CE should continue to be available, with particular opposition to B2-c
- 1 person noted the importance of accounting for discard mortality in CE options and how CE programs can lead to a more sustainable fishery by reducing discards

General Comments:

- Environmental factors play a large role in spawning and recruitment success, including pollution, turbidity, snow melt, in-stream flow, and predation (e.g., blue catfish)
- Climate change and the availability of baitfish also impact stock decline
- Recruitment success is variable with a boom-bust pattern, and we can expect fishing to improve over the next few years
- Virginia has already adopted restrictions (like eliminating the spring trophy fishery) and has been fishing under the commercial quota, which is providing additional conservation
- The commercial sector has already given up a lot, and the reason they are not catching their quota is due to regulation, not because the fish weren't there; the commercial fishery has not been responsible for excess mortality
- Regional flexibility is especially important because no one size fits all, including different environmental conditions in different regions
- Don't want stability to overrule what must be done to restore the fishery
- MRIP numbers are not accurate enough and a better data system is needed

Attendance

- *Attendee list attached separately*
- *Additional VA state staff: Shanna Madsen, Jill Ramsey*

Maine Striped Bass Draft Amendment 7 Public Hearing
Webinar
March 23, 2022
Attendee List

Last Name	First Name	State
Alvarez	Jason	New York
Boulette	James	Maine
Barnes	Duncan	Maine
Batsavage	Chris	North Carolina
Batter	Victoria	Maine
Bickford	Matt	Maine
Bloom	Charlotte	Maine
Boghdan	Kalil	Maine
Borgatti	Christopher	Massachusetts
Bryand	Michael	Maine
Calabrese	Marc	Maine
Calagione	Sam	Delaware
Cieri	Matthew	Maine
Cloutier	Germain	Maine
Cooper	John	Maine
Cummings	Derek	New Hampshire
Cummings	Derek	New Hampshire
Deflumeri	Dominic	New York
Dionne	Joshua	Maine
Dooley	Mike	Maine
Fallon	Peter	Maine
Farris	Jay	Maine
Flaherty	Mike	New York
Friedrich	Anthony	Maryland
Gary	Martin	Virginia
Geissler	Scott	Maine
Gerrish	Parker	Maine
Gibson	Barry	Maine

Hackett	Andrew	New Hampshire
Higgins	Nelson	New York
Horner	Ben	New Hampshire
Humphrey	Bob	Maine
Johnson	Tom	Maine
Kaler	Ben	Maine
Karwacky	Kurt	Maine
Keliher	P	Maine
Kleiner	Don	Maine
Lacey	Tobias	Maine
Landry	Aaron	Maine
Larrabee	Jonathan	Maine
Lennon	Thomas	New York
Lorello	Mike	Maine
Mohan	John	Maine
Mohlin	Pete	Maine
Murphy	Tim	Maine
Nichols	Jeffrey	Maine
Park	Peter	New York
Pecci	David	Maine
Piatek	Chris	Maine
Pilatich	Daniel	New York
Pizzella	Anthony	Maine
Pschirrer	Capt. Rich	Maine
Pucci	Dominick	Maine
Roberts	Courtney	Maine
Rosa	Bryan	Maine
Rudman	Patrick	Maine
Sarcona	Tony	Maine
Schaefer	Kyle	Maine
Sevigny	Josh	Maine
Sevigny	Jamie	Maine

Simoneau	John	Maine
Smith	Marc W	Maine
Sullivan	Owen	New York
Tirado	Lou	Maine
Toole	Michael	New Hampshire
Trenz	Bob	New York
Wagner	Owen	Maine
Wallace	Capt. Eric	Maine
Ware	Megan	Maine
Whalley	Ben	Maine
Whitener	Zach	Maine
Willsea	Flynn	Maine
Woods	Barry	Maine
Woods	Michael	Rhode Island
Zlokovitz	Erik	Maryland

ASMFC Staff: Emilie Franke, Toni Kerns, Maya Drzewicki

New Hampshire Striped Bass Draft Amendment 7 Public Hearing
Hybrid (Portsmouth, NH and Webinar)
March 29, 2022
Webinar Attendee List

Last Name	First Name	State
Barnes	Paul	New Hampshire
Bartolo	John	New Hampshire
Borgatti	Christopher	Massachusetts
Brown	Mark	Maryland
Calitri	Robin	New Hampshire
Cloutier	Germain	Maine
Cuprewich	Ryan	New Jersey
Dionne	Joshua	Maine
Ferguson	James	New Hampshire
Fleming	Richard	New Hampshire
Gallahue	Benjamin	New Hampshire
Gary	Martin	Virginia
Henry	Suzan	New York
Heuss	Rebecca	New Hampshire
Horner	Ben	New Hampshire
Hornick	Harry	Maryland
Jenner	Blaise	Maine
Jewkes	James	Massachusetts
Mathison	Jon	New Hampshire
Mobley	Matt	Maryland
Nesius	Ted	Massachusetts
Omalley	Andrew	New Hampshire
Oake-Libow	Eli	New Hampshire
Patterson	Cheri	New Hampshire
Stallkamp	Christian	New Hampshire
Skorupski	Ed	New York
Sullivan	Kevin	New Hampshire
Woods	Michael	Rhode Island

Zlokovitz	Erik	Maryland
Zobel	Renee	New Hampshire

ASMFC Staff: Emilie Franke, Savannah Lewis

See following page for New Hampshire in-person sign-in.

Atlantic Striped Bass Draft Amendment 7 for Public Comment

Atlantic States Marine Fisheries Commission
March 29, 2022
Portsmouth, NH

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Name	Company/Organization	City, State
Ritchie White	ASMFC	NH
Meggan Hodgson	NHF+G Comm	NH
Ray Green	NHF+G Comm	NH
Peter Whelan	CCA	NH
Sean Maxwell	–	NH
Gregg Nye	–	NH
Mike Hunkus	–	NH

Massachusetts Striped Bass Draft Amendment 7 Public Hearing
Webinar
March 21, 2022
Attendee List

Last Name	First Name	State
Abdow	Mike	Massachusetts
Armstrong	Mike	Massachusetts
Audet	Gerald	Massachusetts
Avila	Jason	Massachusetts
Ayer	Matthew	Massachusetts
Bartolo	John	New Hampshire
Batsavage	Chris	North Carolina
Baunach	Steve	Connecticut
Berry	Howard	New Hampshire
Berwick	Trevor	Connecticut
Borgatti	Christopher	Massachusetts
Boyle	James	Massachusetts
Bravo	Perer	Massachusetts
Cabrera	Jonathan	Massachusetts
Campbell	Scott	Massachusetts
Cannistraro	Dave	Massachusetts
Carter	Ken	Massachusetts
Christian	Mark	Massachusetts
Cloutier	Germain	Maine
Cook	Ryan	Massachusetts
Coombs	Brian	Massachusetts
Creighton	Jack	Massachusetts
Cullen	James	Massachusetts
Cummings	Derek	New Hampshire
Curry	Brian	Massachusetts
Curtin	Brad	Massachusetts
Dannenfelser	Joe	Maryland
Decosta	Robert	Massachusetts

Deflumeri	Dominic	New York
Delzingo	Captain Mike	Massachusetts
Denno	Patrick	Massachusetts
Diggins	Paul	Massachusetts
Dresser	Winslow	Massachusetts
Fallon	Peter	Maine
Feeley	Bob	Massachusetts
Frieden	Jaron	Massachusetts
Friedrich	Anthony	Maryland
Fuda	Tom	Connecticut
Furtado	Jeremy	Massachusetts
Gahagan	Benjamin	Massachusetts
Garst	Steve	Connecticut
Godoi	Diogo	Massachusetts
Golden	Rick	Massachusetts
Goldsmith	Willy	District Of Columbia
Henry	Suzan	New York
Haffey	Kane	Massachusetts
Heath	Tom	Massachusetts
Hoffman	William	Massachusetts
Jaskiel	Jacob	Massachusetts
Jewkes	James	Massachusetts
Kelly	Matthew	Massachusetts
Kaizer	Peter	Massachusetts
Kane	Raymond	Massachusetts
Karwacky	Kurt	Massachusetts
Kelleher	David	Massachusetts
Larson	David	Massachusetts
Lituma	Ivan	Connecticut
Lyons	Michael	Massachusetts
Mazzola	Robert	Massachusetts
Mcdermott	Sean	Massachusetts

Mckiernan	Dan	Massachusetts
Meserve	Nichola	Massachusetts
Mitchell	Billy	Massachusetts
Morabito	James	Massachusetts
Moran	Patrick	Massachusetts
Nelson	Gary	Massachusetts
Nesius	Ted	Massachusetts
Nye	Gregory	Massachusetts
O'donnell	George	Maryland
Oconnor	Jonathan	Massachusetts
Passeck	James	Massachusetts
Peros	Dave	Massachusetts
Perrone	John	Massachusetts
Petracca	Tim	Massachusetts
Pierdinock	Michael	Massachusetts
Poirier	Anthony	Massachusetts
Poston	Will	Maryland
Prodouz	William	Massachusetts
Revere	Avery	Massachusetts
Richardson	John	Massachusetts
Rimmer	David	Massachusetts
Rowley	John	Massachusetts
Santini	Peter	Massachusetts
Savino	Rob	Massachusetts
Silver	Jeffrey	Massachusetts
Simeone	Vincent	Massachusetts
Smith	Kevin	Massachusetts
Soldati	Gary R.	Massachusetts
Spinney	Mike	Massachusetts
Steinback	Scott	Massachusetts
Surdel	Dave	Massachusetts
Sylvestre	George	Massachusetts

Thiebault	Kristen	Massachusetts
Tombros	John	Massachusetts
Toole	Michael	New Hampshire
Tully	Edward	Massachusetts
Walsh	Matt	Massachusetts
Warner	Hans	Maine
Williams	Al	Massachusetts
Witthuhn	Steven	New York
Wood	Richard	Massachusetts
Woods	Michael	Rhode Island
Zimmerman	Brian	Massachusetts
Zlokovitz	Erik	Maryland

ASMFC Staff: Emilie Franke, Toni Kerns

Rhode Island Striped Bass Draft Amendment 7 Public Hearing
Webinar
March 15, 2022
Attendee List

Last Name	First Name	State
Anderson	Dave	Rhode Island
Bellavance	Rick	Rhode Island
Bevacqua	Emil	New Jersey
Blanchard	Kurt	Rhode Island
Bosley	Eric	New York
Cabrera	Jonathan	Massachusetts
Cloutier	Germain	Maine
Cummings	Derek	New Hampshire
Dameron	John	Virginia
Dangelo	Capt. Andy	Rhode Island
Davis	George	Rhode Island
DePersenaire	John	None
Fallon	Peter	Maine
Friedrich	Anthony	Maryland
Fuda	Tom	Connecticut
Gary	Martin	Virginia
Gottschall	Kurt	Connecticut
Hittinger	Rich	Rhode Island
Hornick	Harry	Maryland
Jarvis	Jason	Rhode Island
Jenkins	Peter	Rhode Island
Jenner	Blaise	Maine
Lake	John	Rhode Island
Lengyel Costa	Nicole	Rhode Island
Macari	Joe	Rhode Island
Mataronas	Gary	Rhode Island
Mazzola	Robert	Massachusetts
Mcnamee	Jason	Rhode Island

Monti	Dave	Rhode Island
O'Neill	Tyler	Delaware
Poirier	Anthony	Massachusetts
Poston	Will	Maryland
Sheffield	Phillip	Rhode Island
Spinney	Mike	Massachusetts
Tiska	Carl	Rhode Island
Witthuhn	Steven	New York
Woods	Michael	Rhode Island
Zambrotta	Dennis	Rhode Island
Zlokovitz	Erik	Maryland

ASMFC Staff: Emilie Franke, Toni Kerns, Maya Drzewicki

Connecticut Striped Bass Draft Amendment 7 Public Hearing
Webinar
March 22, 2022
Attendee List

Last Name	First Name	State
Appelman	Max	Maryland
Beneventine	Joseph	Connecticut
Berwick	Trevor	Connecticut
Borgatti	Christopher	Massachusetts
Bravo	Perer	Connecticut
Brewer	Benjamin	Connecticut
Carey	Tim	Connecticut
Catalano	Vincent	New York
Cloutier	Germain	Maine
Collins	David	Connecticut
Davis	Justin	Connecticut
DeFelice	Lou	Connecticut
DeFlumeri	Dominic	New York
Dion	Michael	Connecticut
Dondero	Mark	Connecticut
Dudus	Roman	Connecticut
Findorak	Daniel	Connecticut
Forrest	Todd	Connecticut
Friedrich	Anthony	Maryland
Fuda	Tom	Connecticut
Goldstein	Paul	Connecticut
Gust	Alex	Connecticut
Hardy	Jake	New York
Hyatt	Bill	Connecticut
Ingraham	Taylor	Connecticut
Karbowski	TJ	Connecticut
Kelly	Brian	Connecticut
Kosakoff	Ken	Connecticut

Lapinski	Toby	Connecticut
M Zrelak	Gary	Connecticut
Megargle	Seth	Connecticut
Miner	Senator Craig	Connecticut
Molnar	David	Connecticut
Morgan	Jerry	Connecticut
Nesius	Ted	Massachusetts
O'Sullivan	Jerome	Maine
Patterson	Cheri	New Hampshire
Perrino	Albert	Connecticut
Pitman	L. Robert	Connecticut
Poston	Will	Maryland
Robertson	Matthew	Connecticut
Susca	Matt	Connecticut
Tefft	Joshua	Connecticut
Witthuhn	Steven	New York
Woods	Michael	Rhode Island
Zenel-Walasek	Arek	New York
Zlokovitz	Erik	Maryland

ASMFC Staff: Toni Kerns, Emilie Franke

Atlantic Striped Bass Draft Amendment 7 for Public Comment

Atlantic States Marine Fisheries Commission
March 16, 2022
Kings Park, NY

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Name	Company/Organization	City, State
Liam Monarchio		Port Washington, NY
James Stawecki	LIBBA	East Yaphank NY
Charles Witek		W. Babylon, NY
Garrett Moore	LIBBA547/HHSC	Westbury N.Y.
Chris Faller		Ronkonkoma, NY
Jim Lafferty		Smithtown NY
Craig Cantelmo	VAN STAAL	Cutchogue, NY
Rob Hoff	High Hill SS	Lor G[illegible] NY
Edward J. Mercieca	High Hill Striper C.	Brightcliff Manor, N.Y.
Al Albano	High Hill Striper Club	Sayville, NY 11782
Michael Frank	High Hill Striper Club	Seaford NY 11783
Lonny Ferro	High Hill Striper Club	Lynbrook NY
Steven P. Wacker	High Hill Striper Club	Commack
Sergio Diaz		Sayville, NY
Michael Caruso	The Fisherman Magazine	Mt. Sinai, NY
Angelo Donofrio	"	"
Steve Reith	MOAC	New York.
Ross Squire	MYCRF	Centereach NY
William Kirk		Centereach NY
Dominic Deflumeri		Massapequa Park, NY
Dylan Jarell	All Island	Shirley N.Y.

Name	Company/Organization	City, State
Donald DiCostanzo	HHSC	Commack NY
Joseph Gittleman	LIBBA	Babylon, NY
Peter Jeremy	HHSC	Bronx NY
Steve KNAPIK	Stanton Surf Club	Nassau County NY
Klaus Rondinella	L.I.B.B.A	Nassau/Suffolk NY
Jim Frank		New Rochelle NY
Carl LoBue	+ NC	Huntington NY
PHILIP ROMANO	BAYSIDE ANGLERS GROUP	~~FLU~~ BAYSIDE N.Y.
Matt Broderick	The Fisherman Magazine	Medford NY.

Atlantic Striped Bass Draft Amendment 7 for Public Comment

Atlantic States Marine Fisheries Commission
March 23, 2022
New Paltz, NY

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Name	Company/Organization	City, State
Jay Martin	SELF	ACCORD, NY
Michelle Stretch	Self	Dutchess . NY
JEFF HELMUTH	SELF	SAUGERTIES, NY
Tom BAUDANZA	Self	SAUGERTIES, NY
Al SCHULTZ	SELF	OLIVEBRIDGE NY.
Chris Palmer	SELF	NEW HAMPTON, NY
George Murphy	Hudson River Charter	NY
Jacob O Dodd	self	saugerties NY
Fred Carney	Self	Saugerties NY
Harold Carter	Self	Saugerties NY
Paul Wipf	Self	Esopus NY
BOBBY TAYLOR		Kingston NY
Michael Ford	Reel Addicted Charters	Big Indian NY
Rick Ecker	Self	Kingston NY
HAROLD MULKOWSKY	SELF	ACCORD NY
ANDREW WERKSTEMA	SELF	NEWBURGH, NY
Chris M[illegible]	Self	Walden, NY
Roger Cornell	SELF	Lagrange, NY
JUSTIN Cocca	SELF	TROY NY.
Chris Oliver	Keepin it Reel	Poughkeepsie NY
MIKE TRACEY	MONSTER HUNTER CHARTER	TROY NY

Atlantic Striped Bass Draft Amendment 7 for Public Comment

Atlantic States Marine Fisheries Commission
March 23, 2022
New Paltz, NY

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Name	Company/Organization	City, State
Ed Skorupski	Self	Stillwater, NY
Megan Sutton	Self	Ruby, NY
Captain Suzanne [illegible]	Self	Poughkeepsie, NY
Ralph J. Albino	Self	West Kill NY
Zach Schubert	Self	Earlton, NY
Jess Wagenbaugh	Self	Earlton, NY
Frank Maresco	SELF	New Windsor, NY
Mark Gyndmon		
Sarah LaLumiere	SElF	Kerhonkson, NY
Amanda Simmonds	Self	New Paltz, NY
Endrina Gonzalez	Self	Newburgh NY.
Pat Gallagher	Tippin' Scales	Kingston
Tom Dimmer	DEC	
Nickolas Lange	Totally Hooked charters	Kingston N.Y.
Steve Meyer	Self	Millbrook, NY,
JOHN LENNON		LIBERTY, NY
Martin Barth	Self	NY

Name	Company/Organization	City, State
Kim Doyle	self	Phoenicia NY
Holly Clark	Self	New Paltz, NY
Kenneth Lus	Self	Newburgh, NY
Will DePaolo	Self	Liberty, NY

Name	Company/Organization	City, State
Ty & Kaity Stein		Cairo New York
Lawrence Kupiec		LaGrangeville, NY
Haley Josephson	Self	New Paltz, NY
Tay Fiumara		Pok, N Y.

New Jersey-Pennsylvania Striped Bass Draft Amendment 7 Public Hearing
Webinar
March 14, 2022
Attendee List

Last Name	First Name	State
Albanese	Joseph	New Jersey
Azzinaro	John	New Jersey
Alessi	Kieran	New Jersey
Audet	Jerry	None
Augustino	Mason	New Jersey
Barry	Linda	New Jersey
Bazydlo	Bryan	New Jersey
Belsky	Robert	New Jersey
Bolen	Keith	New Jersey
Brihn	Rich	New Jersey
Brust	Jeffrey	New Jersey
Chikotas	Bryan	Pennsylvania
Campion	George	Delaware
Celestino	Michael	New Jersey
Chayes	Fletcher	New Jersey
Cimino	Joe	New Jersey
Cloutier	Germain	Maine
Corbett	Heather	New Jersey
Cudnik	Greg	New Jersey
Curtiss	Ken	New Jersey
Defonteny	Louis	New Jersey
Dangelo	Tony	New Jersey
Deflumeri	Dominic	New York
Depersenaire	John	New Jersey
Dupointe	Chris	New Jersey
Elliott	Warren	Pennsylvania
Emerson	Clay	New Jersey
Fallon	Peter	Maine

Fote	Tom	New Jersey
Friedrich	Anthony	Maryland
Glassberg	David	New Jersey
Gary	Martin	Virginia
George	Steve	New Jersey
Grabowski	Tyler	Pennsylvania
Grossman	Andy	New Jersey
Haasz	Steve	New Jersey
Handley	Brooke	New Jersey
Harbula	Joseph	New Jersey
Harcourt	Kyle	New Jersey
Harrison	Brendan	New Jersey
Hartley	Victor	New Jersey
Honachefsky	Nick	New Jersey
Hutchinson	Jim	New Jersey
Intile	Joseph	New Jersey
K	Ray	New Jersey
Kiernan	Austin	New Jersey
Kuhn	Kris	Pennsylvania
Kull	Laura	New Jersey
Leaun	Dave	New Jersey
Lerro	Anthony	New Jersey
Levy	Eric	New Jersey
Lospinoso	Gregory	New Jersey
Lustig	Loren	Pennsylvania
Moore	Derek	New Jersey
Macquesten	Samantha	New Jersey
Machalaba	Stephen	New Jersey
Markiewicz	Karl	Delaware
Marzolla	Paul	New Jersey
Matulonis	Thomas	New Jersey
Mazzola	Robert	Massachusetts

Mcgee	Thomas	New Jersey
Mcilrath	Craig	New Jersey
Mitchell	Dennis	Pennsylvania
Montefusco	Nick	New Jersey
Myer	Chris	Pennsylvania
Natoli	Richard	Pennsylvania
Neilan	Brian	New Jersey
Nguyen	Khoa	Pennsylvania
Nicastro	Luke	Pennsylvania
Nihart	David	Pennsylvania
Nowalsky	Adam	New Jersey
Orens	Charles	New Jersey
Paggi	Joseph	New Jersey
Peikin	Jeffrwy	Pennsylvania
Polizzi	Anthony	New Jersey
Porta	Mike	Pennsylvania
Poston	Will	Maryland
Purvin	Michael	New Jersey
Rusch	Douglas	New Jersey
Reisen	Joseph	New Jersey
Reta	Michael	New Jersey
Risser	Matthew	Pennsylvania
Shillingford	Bill	New Jersey
Sanchez	John	New Jersey
Simon	Philip	New Jersey
Skelly	Michael	New Jersey
Sodon	Robert	New Jersey
Spatta	Kenneth	New Jersey
Taylor	David	New Jersey
Taylor	Douglas	New Jersey
Thomas	Scott	New Jersey
Toth	John	New Jersey

Ulrich	Arnold	New Jersey
Van Hassent	Howard	New Jersey
Vilceanu	Radu	New Jersey
Witthuhn	Steven	New York
Walsifer	Peter	New Jersey
Walters	Brian	New Jersey
Warcola	Casey	New Jersey
Whitmore	Kelly	New Jersey
Woods	Michael	New Jersey
Zakrzewski	Edward	New Jersey
Zappella	Frank	New Jersey
Zemeckis	Douglas	New Jersey

ASMFC Staff: Emilie Franke, Toni Kerns, Savannah Lewis

Delaware Striped Bass Draft Amendment 7 Public Hearing
Webinar
March 10, 2022
Attendee List

Last Name	First Name	State
Barr	Janine	Delaware
Clark	John	Delaware
Cloutier	Germain	Maine
Conroy	Margaret	Delaware
Deller	Michael	Delaware
Dameron	John	Virginia
DeFlumeri	Dominic	New York
Delzingo	Captain Mike	Massachusetts
Friedrich	Anthony	Maryland
Fuda	Tom	Connecticut
Gary	Martin	Virginia
Lordo	Anthony	New Jersey
Miller	Roy	Delaware
O'Neill	Tyler	Delaware
Poston	Will	Maryland
Rakes	Shawn	Delaware
Smith	Chris	Delaware
Smith	Joseph	Delaware
Smith	Chris	Delaware
Stangl	Michael	Delaware
Stormer	David	Delaware
Townsend	Wes	Delaware
Woolford-Badur	Danielle	Delaware
Yenkinson	Harvey	New Jersey
Zimmerman	Jordan	Delaware

ASMFC Staff: Emilie Franke, Savannah Lewis, Tracey Bauer

Maryland Striped Bass Draft Amendment 7 Public Hearing
Webinar
March 28, 2022
Attendee List

Last Name	First Name	State
Aus	Andrew	Maryland
Avila	Jason	Maryland
Brown	Mark	Maryland
Brown	Simon	Maryland
Brupbacher	Michael	Maryland
Chastrist	Cj	Maryland
Carski	Ted	Maryland
Cloutier	Germain	Maine
Cockx	Justin	New York
Colden	Allison	Maryland
Cool	Michael	Maryland
Davis	Christopher	New York
Dean	Rachel	Maryland
Dintaman	Evan	Maryland
Dionne	Joshua	Maine
Ditmars	Zach	Maryland
Dollar	Chris	Maryland
Dondero	Mark	Connecticut
Eff	Rex	Maryland
Eustis	Mark	Maryland
Fegley	Lynn	Maryland
Fleming	Beverly	Maryland
Fletcher	Robert	Maryland
Frey	Sewell "Toby"	Maryland
Gaff	Jerry	Maryland
Gary	Martin	Virginia
Genovese	Paul	Maryland
Griffin	Steve	Maryland

Henry	Suzan	New York
Hardman	Brian	Maryland
Holsey	Greg	Maryland
Horne	Jeffrey	Maryland
Horner	Ben	New Hampshire
Hornick	Harry	Maryland
Landis	Edwin	New Jersey
Lash	Marilyn	Maryland
Laube	Christopher	Maryland
Lesser	Kevin	Virginia
Lewis	Kenneth	Maryland
Lewis	Lloyd	Maryland
Luisi	Michael	Maryland
Lyons Gromen	Pamela	Florida
Maginnes	David	Maryland
Malec	Brandon	Maryland
Mathison	Jon	Massachusetts
McMenamin	Kevin	Maryland
Meyers	S	Virginia
Mobley	Matt	Maryland
Moore	Walter	Maryland
Morse	Matt	Maryland
Mortus	Timothy	Maryland
Munro	Bob	Maryland
Newberry	Capt. Robert	Maryland
O'Donnell	George	Maryland
Olmstead	Bert	Maryland
O'Neill	Tyler	Delaware
Packard	Eric	Maryland
Pennisi	Matthew	New York
Pierce	Don	Maryland
Prestwich	Ron	Maryland

Rehner	Stephen	Maryland
Roberts	Tom	Maryland
Rudow	Mollie	Maryland
Rudow	Lenny	Maryland
Seidle	Stephanie	Maryland
Seigel	Buddy	Maryland
Seman	Jason	Maryland
Sharov	Alexei	Maryland
Shoultz	Matthew	Maryland
Shute	Greg	Maryland
Sikorski	David	Maryland
Smolek	Michael	Maryland
Spinney	Mike	Massachusetts
Sutton	Allen	Maryland
Swart	Thomas	New York
Tippett	Lee	Maryland
Versak	Beth	Maryland
Wingate	Brandon	Maryland
Walbert	John	Maryland
Willey	Angel	Maryland
Williams	John Page	Virginia
Witthuhn	Steven	New York
Woods	Michael	Rhode Island
Zalesak	Phil	Maryland
Zlokovitz	Erik	Maryland

ASMFC Staff: Emilie Franke, Toni Kerns

Atlantic Striped Bass Draft Amendment 7 for Public Comment

Atlantic States Marine Fisheries Commission
March 8, 2022
Colonial Beach, VA

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Name	Company/Organization	City, State
G. Gale Willett	Self	White Plains MD
[illegible]	Charles Co	Faulkner Md
Russell Sullivan	PRFC	Bel Alton Md.
Ben Ames	PRFC Finfish	Reedville, VA
Ryan Rogers	PRFC	Reedville, Va.
William L. Rice Sr.	Self & Piccowaxen Ck. Seafood	Newburg, MD.
John Dameron	PRFC Finfish	Kinsale VA
[illegible]		Reedville VA
[illegible]		Stafford
Robert T Brown	MWA	St. Mary's MD
Victoria M Brown	St. Mary's	MD
Frank Swann		Newburg md
Mike Swann		Newburg Md.
Gary [illegible]	Potomac water [illegible]	King George, VA

Virginia Striped Bass Draft Amendment 7 Public Hearing
Webinar
March 9, 2022
Attendee List

Last Name	First Name	State
Alverson	Harry	Massachusetts
Atkinson	Steve	Virginia
Batsavage	Chris	North Carolina
Belkoski	David	North Carolina
Bello	John	Virginia
Bentley	Kevin	Connecticut
Bertoline	Susan	New York
Buchanan	Jack	Virginia
Cammarata	Julie	Connecticut
Cloutier	Germain	Maine
Cowles	Reynolds	Virginia
Dameron	John	Virginia
Defelice	Lou	Connecticut
Deem	Jeff	Virginia
Dion	Michael	Virginia
Estabrook	Susan	Rhode Island
Fuda	Tom	Connecticut
Geer	Pat	Virginia
Gurley	Mike	Virginia
Haasz	Steve	New Jersey
Hardison	Sean	Virginia
Heinold	Paul	Virginia
Higgins	Jaclyn	Missouri
Hunsinger	Brent	Virginia
Jewkes	James	Massachusetts
Lesser	Kevin	Virginia
Ludford	Chris	Virginia
Madsen	Shanna	Virginia

Moore	Chris	Virginia
Murphy	Kenneth	Maryland
Musick	Susanna	Virginia
Oliver	Zane	Virginia
Ostrander	Capt. Mike	Virginia
Pirro	Donald	New Jersey
Place	Kelly	Virginia
Poston	Will	Maryland
Purvin	Michael	New Jersey
Quinan	Michael	Virginia
Ramsey	Jill	Virginia
Reta	Michael	New Jersey
Rowe	Tyler	Virginia
Rudacille	Bryan	Virginia
Schaefer	Kyle	Maine
Trenz	Bob	New York
Williams	John Page	Virginia
Wood	Richard	Massachusetts
Zlokovitz	Erik	Maryland

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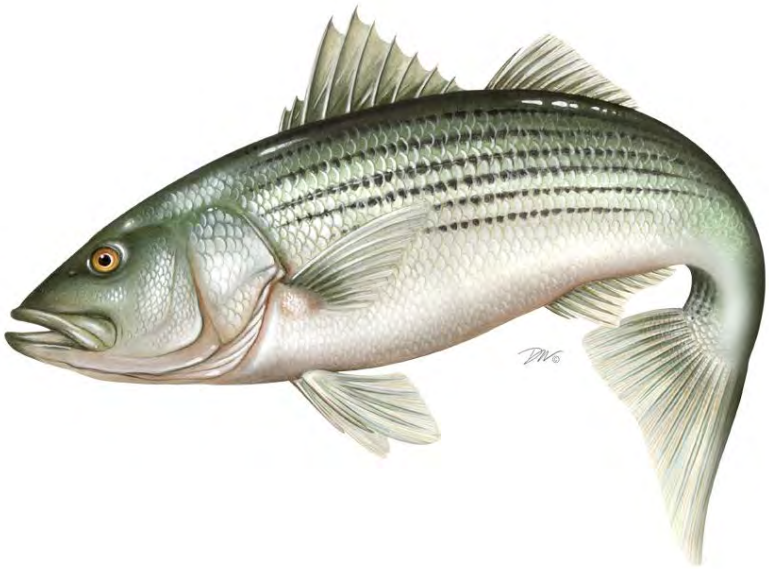
Atlantic States Marine Fisheries Commission

DRAFT ADDENDUM VII TO AMENDMENT 6 TO THE ATLANTIC STRIPED BASS INTERSTATE FISHERY MANAGEMENT PLAN



This draft document was developed for Management Board review and discussion. This document is not intended to solicit public comment as part of the Commission/State formal public input process. Comments on this draft document may be given at the appropriate time on the agenda during the scheduled meeting. If approved, a public comment period will be established to solicit input on the issues contained in the document.

October 2021

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

Public Comment Process and Proposed Timeline

In August 2021, the Atlantic Striped Bass Management Board (Board) initiated the development of an addendum to Amendment 6 to the Interstate Fishery Management Plan for Atlantic Striped Bass to consider allowing voluntary transfers of ocean commercial quota. This Draft Addendum presents background on the Atlantic States Marine Fisheries Commission's (Commission) management of striped bass; the addendum process and timeline; and a statement of the problem. This document also provides management options for public consideration and comment.

The public is encouraged to submit comments regarding this document at any time during the public comment period. The final date comments will be accepted is **XXXXX at 11:59 p.m. (EST).** Comments may be submitted at state public hearings or by mail, email, or fax. If you have any questions or would like to submit comment, please use the contact information below. Organizations planning to release an action alert in response to this Draft Addendum should contact Emilie Franke, Fishery Management Plan Coordinator, at efranke@asmfc.org or 703.842.0740.

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1.0 Introduction

Atlantic striped bass (*Morone saxatilis*) are managed through the Commission in state waters (0-3 miles) and through NOAA Fisheries in federal waters (3-200 miles). The management unit includes the coastal migratory stock between Maine and North Carolina. Atlantic striped bass are currently managed under Amendment 6 to the Interstate Fishery Management Plan (FMP) and Addenda I – VI.

The Atlantic Striped Bass Management Board (Board) initiated Draft Addendum VII in August 2021 through the following motion: *Move to initiate an addendum to amendment 6 to allow voluntary transfers of commercial striped bass quota as outlined in the memo of July 26th, 2021 to the Atlantic Striped Bass Management Board regarding these transfers*. To address the Board motion this Addendum considers allowing the voluntary transfer of the commercial coastal quota between states.

2.0 Overview

2.1 Statement of the Problem

In August 2020, the Board initiated development of Amendment 7 to the FMP. The purpose of the amendment is to update the management program in order to reflect current fishery needs and priorities given the status and understanding of the resource and fishery has changed considerably since implementation of Amendment 6 in 2003. The Board intends for the amendment to build upon the Addendum VI action to end overfishing and initiate rebuilding. In February 2021, the Board approved for public comment the Public Information Document (PID) for Draft Amendment 7. As the first step in the amendment process, the PID was a broad scoping document seeking public input on a number of important issues facing striped bass management, including coastal commercial quota allocation. The PID had proposed considering changes to the coastal commercial quota allocation because the striped bass commercial quota allocation has been based on harvest data from the 1970s which may, or may not be an appropriate baseline. Harvester reporting during that time was not required and there is evidence that harvesters would sell fish in other states resulting in further inaccuracies in state estimates. No other ASMFC-managed species is managed with harvest data as old as that used for striped bass allocation.

In May, after the PID public comment period, the Board approved the following issues for development in Draft Amendment 7: recreational release mortality, conservation equivalency, management triggers, and measures to protect the 2015 year class. The Board did not include the coastal commercial quota allocation issue for further consideration in the Draft Amendment. Many Board members acknowledge the concerns that were raised by states and the public but found it was not the right time to address allocation. The Board noted the Draft Amendment process is not the right time to address this because allocation discussions could make the process significantly longer and more complex. Some Board members suggested addressing quota allocation in a separate management document after Amendment 7 is complete. While waiting until after the Amendment process is complete would allow for the issue to be considered, the unknown timeline for when possible new allocations could be finalized was raised. In order to provide a management option that could provide some immediate relief to states that were seeking a change in commercial quota allocation, the Board initiated this addendum which proposes to allow for the voluntary transfer of commercial allocation of the coastal quota. Many quota-managed fisheries allow for the voluntary transfer of commercial allocations

between states (e.g., black sea bass, bluefish or horseshoe crab). This is a useful technique that can be utilized to address a variety of problems in the management of a commercial fishery (e.g., quota overages, safe harbor landings, shifting stock distributions).

2.2 Background

2.2.1 Status of the Stock

On a regular basis, female spawning stock biomass (SSB) and fishing mortality rate (F) are estimated and compared to target and threshold levels (i.e., biological reference points) in order to assess the status of the striped bass stock. The 1995 estimate of female SSB is currently used as the SSB threshold because many stock characteristics, such as an expanded age structure, were reached by this year, and this is also the year the stock was declared recovered. The female SSB target is equal to 125% female SSB threshold. The associated F threshold and target are calculated to achieve the respective SSB reference points in the long term.

In May 2019, the Board accepted the 2018 Benchmark Stock Assessment and Peer Review Report for management use. The accepted model is a forward projecting statistical catch-at-age model, which uses catch-at-age data and fishery-dependent data and fishery-independent survey indices to estimate annual population size, fishing mortality, and recruitment. The assessment indicated the resource is overfished and experiencing overfishing relative to the updated reference points. Female SSB in the terminal year (2017) was estimated at 151 million pounds, which is below the SSB threshold of 202 million pounds. F in 2017 was estimated at 0.31, which is above the F threshold of 0.24.

The assessment also indicated a period of strong recruitment (numbers of age-1 fish entering the population) from 1994-2004, following by a period of low recruitment from 2005-2011 which likely contributed to the decline in SSB in recent years. Recruitment was high in 2012, 2015, and 2016. In 2017, recruitment was estimated at 108.8 million age-1 fish which is below the time series average of 140.9 million fish.

2.2.2 History of the Fishery Management Plan

The first Interstate FMP for Atlantic Striped Bass was approved in 1981 in response to declining juvenile recruitment and landings occurring along the coast from Maine through North Carolina. The FMP and subsequent amendments and addenda focused on addressing the depleted spawning stock and recruitment failure. Despite these management efforts, the Atlantic striped bass stock continued to decline prompting many states (beginning with Maryland in 1985) to impose a complete harvest moratorium for several years. State fisheries reopened in 1990 under Amendment 4 which aimed to rebuild the resource rather than maximize yield. The stock was ultimately declared rebuilt in 1995 and as a result, Amendment 5 to the Atlantic Striped Bass FMP was adopted which relaxed both recreational and commercial regulations along the coast.

The Atlantic striped bass stock is currently managed under Amendment 6 and its subsequent addenda. The most recent, Addendum VI, set measures to end overfishing, and bring *F* to the target level in 2020. Specifically, the Addendum reduces all state commercial quotas by 18%, and implements a 1-fish bag limit and a 28” to less than 35” recreational slot limit for ocean fisheries and a 1-fish bag limit and

an 18" minimum size limit for Chesapeake Bay recreational fisheries. The measures are designed to achieve at least an 18% reduction in total removals at the coastwide level. The Addendum maintains flexibility for states to pursue alternative regulations through conservation equivalency (CE). Since catch and release practices contribute significantly to overall fishing mortality, the Addendum mandates the use of circle hooks when recreationally fishing with bait to reduce release mortality in recreational striped bass fisheries. Outreach and education will be a necessary element to garner support and compliance with this important conservation measure.

The U.S. Exclusive Economic Zone (EEZ; 3-200 miles from shore) has been closed to the harvest, possession, and targeting of striped bass since 1990, with the exception of a defined route to and from Block Island in Rhode Island to allow for the transit of vessels in possession of striped bass legally harvested in adjacent state waters. A recommendation was made in Amendment 6 to re-open federal waters to commercial and recreational fisheries. However, NOAA Fisheries concluded opening the EEZ to striped bass fishing was not warranted at that time. Following the completion of the 2018 benchmark stock assessment, NOAA Fisheries, in consultation with the Commission, is directed to review the federal moratorium on Atlantic striped bass, and to consider lifting the ban on striped bass fishing in the Federal Block Island Transit Zone (Consolidated Appropriations Act, 2018).

The Board previously considered commercial quota transfers in the FMP through Draft Amendment 5 for public comment and Draft Addendum IV to Amendment 6 for public comment. The Board did not approve the use of transfers in Amendment 5 in order to focus efforts on rebuilding the stock. The Technical Committee raised concerns that transfers had the potential to increase harvest at a time when harvest reductions were needed which contributed to the Board not approving transfers under Addendum IV to Amendment 6.

2.2.3 Status of the Fishery

In 2020, total Atlantic striped bass removals (commercial and recreational, including harvest, commercial discards and recreational release mortality) was estimated at 5.1 million fish, which is a 7% decrease relative to 2019 (Table 4). The recreational sector accounted for 87% of total removals by number.

Commercial Fishery Status

The commercial fishery is managed via a quota system resulting in relatively stable landings since 2004 (refer to Table 5 for a summary of striped bass regulations by state in 2020). There are two regional quotas: one for Chesapeake Bay and one for the ocean region (Maine through North Carolina, excluding Pennsylvania). The ocean region quota is based on average landings during the 1970s and the Chesapeake Bay quota changed annually under a harvest control rule until implementation of a static quota in 2015 through Addendum IV.

Coastal Commercial Quota

In 2020, the ocean commercial quota was 2,411,154 pounds and was not exceeded. Table 1 contains final 2020 quotas per Addendum VI and approved conservation equivalency programs and harvest that occurred in 2020.

Chesapeake Bay Commercial Quota

In 2020, the Chesapeake Bay-wide quota was 2,998,374 pounds and was allocated to Maryland, the Potomac River Fisheries Commission (PRFC), and Virginia based on historical harvest. In 2020, the Bay-wide quota was not exceeded. Table 1 contains jurisdiction-specific quotas and harvest that occurred in 2020 for Chesapeake Bay. In 2020, commercial harvest from Chesapeake Bay accounted for 64% of total commercial landings by weight, and averaged 61% annually under Addendum IV (2015-2019).

Commercial Fishery Landings

From 2004 to 2014, coastwide commercial harvest averaged 6.8 million pounds (942,922 fish) annually (Table 2). From 2015-2019, commercial landings decreased to an average of 4.7 million pounds (619,716 fish) due to implementation of Addendum IV and a reduction in the commercial quota. Commercial landings in 2020 were estimated at 3.6 million pounds (577,363 fish). Commercial discards are estimated to account for <2% of total removals per year since 2003 (Table 4). In 2019, commercial removals (landings plus commercial discards) accounted for 13.5% of total removals (commercial plus recreational) in numbers of fish, and 12.6% of total removals in 2020.

The commercial fishery harvested 3.73 million pounds (577,363 fish) in 2020, which is a 17% decrease by weight relative to 2019 (12% decrease by number; Table 2). This decrease aligns with the 18% reduction in commercial quotas implemented through Addendum VI in 2020, although some states implemented a different level of reduction in their commercial quotas through approved state conservation equivalency plans. The ocean quota utilization was about the same in 2020 (53%) as in 2019 (51%), while the Chesapeake Bay quota utilization decreased to 76% in 2020 from 91% in 2019. Despite the coastwide decrease in commercial harvest, ocean fishery conditions for some states may have improved from 2019 to 2020, which could be attributed to the increased availability of year classes moving through certain areas. The impacts of COVID-19 on the striped bass commercial fishery likely varied among states and varied depending on timing within the season. Some states heard from industry that restaurant closures and low prices had negative impacts on the commercial season, particularly during the early part of the pandemic.

Maryland (38%), Virginia (19%), and NY (13%) accounted for the three highest proportions of the commercial harvest (by weight) in 2020 (Table 3; Figure 1). Additional harvest came from PRFC (11%), Massachusetts (11%), Delaware (4%), and Rhode Island (3%). Commercial harvest from Chesapeake Bay accounted for 64% of the total commercial harvest by weight. The proportion of commercial harvest coming from Chesapeake Bay is much higher in numbers of fish (84% in 2020) than by weight because fish harvested in Chesapeake Bay have a lower average weight than fish harvested in ocean fisheries (Table 6). Coastwide commercial dead discards were estimated at 65,319[1] fish, which accounts for <2% of total removals in 2020 (Table 4).

The ocean region regularly underutilizes its quota allocations due to lack of availability in state waters (particularly off of North Carolina) and because commercial fishing is not allowed in some states (Maine, New Hampshire, Connecticut and New Jersey which collectively share about 10% of the ocean

[1] Commercial dead discard estimates are derived via a generalized additive model (GAM), and are therefore re-estimated for the entire time series when a new year of data is added.

commercial quota). Furthermore, the underage has increased in recent years since migratory striped bass have not been available to the ocean fishery in North Carolina resulting in zero harvest since 2012 (North Carolina holds 13% of the ocean quota) and raising questions about altered migratory pathways or preferred foraging areas as a result of climate change.

Recreational Fishery Status

For details on the most recent recreational fishery status see the Review for the Fishery Management Plan for Striped Bass: Fishing Year 2020.

3.0 Proposed Management Program

3.1 State-to-State Commercial Quota Transfers of the Coastal Commercial Quota

Option A: Status quo, no commercial quota transfers are permitted.

Option B: Commercial quota transfer provision of the coastal commercial quota.

Transfers between states may occur upon agreement of two states at any time during the fishing season up to 45 days after the last day of the calendar year. All transfers require a donor state (state giving quota) and a receiving state (state accepting additional quota). There is no limit on the amount of quota that can be transferred by this mechanism, and the terms and conditions of the transfer are to be identified solely by the parties involved in the transfer. The Administrative Commissioner of the agencies involved (giving and receiving state) must submit a signed letter to the Commission identifying the involved states, species, and pounds of quota to be transferred between the parties. A transfer becomes effective upon receipt of a letter from Commission staff to the donor and receiving states, and does not require the approval by the Board. All transfers are final upon receipt of the signed letters by the Commission. In the event that the donor or receiving state of a transaction subsequently wishes to change the amount or details of the transaction, both parties have to agree to the change, and submit to the Commission signed letters from the Administrative Commissioner of the agencies involved. These transfers do not permanently affect the state-specific shares of the quota (i.e., the state-specific quotas remain fixed).

Once quota has been transferred to a state, the state receiving quota becomes responsible for any overages of transferred quota. That is, the amount over the final quota (that state's quota plus any quota transferred to that state) for a state will be deducted from the corresponding state's quota the following fishing season.

4.0 Compliance Schedule

To be in compliance with Addendum VII to Amendment 6 to the Atlantic Striped Bass Interstate FMP, states must implement Addendum VII:

Compliance Schedule to be determined by the Board.

5.0 Tables and Figures

Table 1. Results of 2020 commercial quota accounting in pounds. Source: 2021 state compliance reports. 2020 quota was based on Addendum VI and approved conservation equivalency programs.

State	Add VI (base)	2020 Quota^	2020 Harvest	Overage
Ocean				
Maine*	154	154	-	-
New Hampshire*	3,537	3,537	-	-
Massachusetts	713,247	735,240	386,924	0
Rhode Island	148,889	148,889	115,891	0
Connecticut*	14,607	14,607	-	-
New York	652,552	640,718	473,461	0
New Jersey**	197,877	215,912	-	-
Delaware	118,970	142,474	137,986	0
Maryland	74,396	89,094	83,594	0
Virginia	113,685	125,034	77,239	0
North Carolina	295,495	295,495	0	0
Ocean Total	**2,333,409**	**2,411,154**	**1,275,095**	**0**
Chesapeake Bay				
Maryland	**2,588,603**	1,442,120	1,273,757	0
Virginia		983,393	611,745	0
PRFC		572,861	400,319	0
Bay Total		**2,998,374**	**2,285,821**	**0**

* Commercial harvest/sale prohibited, with no re-allocation of quota.

** Commercial harvest/sale prohibited, with re-allocation of quota to the recreational fishery.

^ 2020 quota changed through conservation equivalency for MA (735,240 lbs), NY (640,718 lbs), NJ (215,912 lbs), DE (142,474 lbs), MD (ocean: 89,094 lbs; bay: 1,445,394 lbs), PRFC (572,861 lbs), VA (ocean: 125,034 lbs; bay: 983,393 lbs).

Note: Maryland's Chesapeake Bay quota for 2020 was adjusted to account for the overage in 2019.

Table 2. Total harvest of Atlantic striped bass by sector, 1990-2020. Note: Harvest is from state compliance reports/MRIP (Query July 8, 2021). Estimates exclude inshore harvest from North Carolina.

Year	Numbers of Fish			Pounds		
	Commercial	Recreational	Total	Commercial	Recreational	Total
1990	93,888	578,897	672,785	715,902	8,207,515	8,923,417
1991	158,491	798,260	956,751	966,096	10,640,601	11,606,697
1992	256,476	869,779	1,126,255	1,508,064	11,921,967	13,430,031
1993	314,526	789,037	1,103,563	1,800,176	10,163,767	11,963,943
1994	325,401	1,055,523	1,380,924	1,877,197	14,737,911	16,615,108
1995	537,412	2,287,578	2,824,990	3,775,586	27,072,321	30,847,907
1996	854,102	2,487,422	3,341,524	4,822,874	28,625,685	33,448,559
1997	1,076,591	2,774,981	3,851,572	6,078,566	30,616,093	36,694,659
1998	1,215,219	2,915,390	4,130,609	6,552,111	29,603,199	36,155,310
1999	1,223,572	3,123,496	4,347,068	6,474,290	33,564,988	40,039,278
2000	1,216,812	3,802,477	5,019,289	6,719,521	34,050,817	40,770,338
2001	931,412	4,052,474	4,983,886	6,266,769	39,263,154	45,529,923
2002	928,085	4,005,084	4,933,169	6,138,180	41,840,025	47,978,205
2003	854,326	4,781,402	5,635,728	6,750,491	54,091,836	60,842,327
2004	879,768	4,553,027	5,432,795	7,317,897	53,031,074	60,348,971
2005	970,403	4,480,802	5,451,205	7,121,492	57,421,174	64,542,666
2006	1,047,648	4,883,961	5,931,609	6,568,970	50,674,431	57,243,401
2007	1,015,114	3,944,679	4,959,793	7,047,179	42,823,614	49,870,793
2008	1,027,837	4,381,186	5,409,023	7,190,701	56,665,318	63,856,019
2009	1,049,838	4,700,222	5,750,060	7,217,380	54,411,389	61,628,769
2010	1,031,430	5,388,440	6,419,870	6,996,713	61,431,360	68,428,073
2011	944,777	5,006,358	5,951,135	6,789,792	59,592,092	66,381,884
2012	870,684	4,046,299	4,916,983	6,516,761	53,256,619	59,773,380
2013	784,379	5,157,760	5,942,139	5,819,678	65,057,289	70,876,967
2014	750,263	4,033,746	4,784,009	5,937,949	47,948,610	53,886,559
2015	621,952	3,085,725	3,707,677	4,829,997	39,898,799	44,728,796
2016	609,028	3,500,434	4,109,462	4,848,772	43,671,532	48,520,304
2017	592,670	2,937,911	3,530,581	4,816,395	37,952,581	42,768,976
2018	621,123	2,244,765	2,865,888	4,741,342	23,069,028	27,810,370
2019	653,807	2,150,936	2,804,743	4,284,831	23,556,287	27,841,118
2020	577,363	1,709,973	2,287,336	3,560,917	14,858,984	18,419,901

Table 3. Commercial harvest by region in pounds (x1000), 1995-2020. Source: state compliance reports. ^Estimates exclude inshore harvest.

Year	Ocean								Chesapeake Bay				Grand Total
	MA	RI	NY	DE	MD	VA	NC^	Total	MD	PRFC	VA	Total	
1995	751.5	113.5	500.8	38.5	79.3	46.2	344.6	1,874.3	1,185.0	198.5	517.8	1,901.3	3,775.6
1996	695.9	122.6	504.4	120.5	75.7	165.9	58.2	1,743.2	1,487.7	346.8	1,245.2	3,079.7	4,822.9
1997	784.9	96.5	460.8	166.0	94.0	179.1	463.1	2,244.4	2,119.2	731.9	983.0	3,834.2	6,078.6
1998	810.1	94.7	485.9	163.7	84.6	375.0	273.0	2,287.0	2,426.7	726.2	1,112.2	4,265.1	6,552.1
1999	766.2	119.7	491.8	176.3	62.6	614.8	391.5	2,622.9	2,274.8	653.3	923.4	3,851.4	6,474.3
2000	796.2	111.8	542.7	145.1	149.7	932.7	162.4	2,840.5	2,261.8	666.0	951.2	3,879.0	6,719.5
2001	815.4	129.7	633.1	198.6	113.9	782.4	381.1	3,054.1	1,660.9	658.7	893.1	3,212.6	6,266.8
2002	924.9	129.2	518.6	146.2	93.2	710.2	441.0	2,963.2	1,759.4	521.0	894.4	3,174.9	6,138.2
2003	1,055.5	190.2	753.3	191.2	103.9	166.4	201.2	2,661.7	1,721.8	676.6	1,690.4	4,088.7	6,750.5
2004	1,214.2	215.1	741.7	176.5	134.2	161.3	605.4	3,248.3	1,790.3	772.3	1,507.0	4,069.6	7,317.9
2005	1,102.2	215.6	689.8	174.0	46.9	185.2	604.5	3,018.2	2,008.7	533.6	1,561.0	4,103.3	7,121.5
2006	1,322.3	5.1	688.4	184.2	91.1	195.0	74.2	2,560.2	2,116.3	673.5	1,219.0	4,008.7	6,569.0
2007	1,039.3	240.6	731.5	188.7	96.3	162.3	379.5	2,838.1	2,240.6	599.3	1,369.2	4,209.1	7,047.2
2008	1,160.3	245.9	653.1	188.7	118.0	163.1	288.4	2,817.6	2,208.0	613.8	1,551.3	4,373.1	7,190.7
2009	1,134.3	234.8	789.9	192.3	127.3	140.4	190.0	2,809.0	2,267.3	727.8	1,413.3	4,408.4	7,217.4
2010	1,224.5	248.9	786.8	185.4	44.8	127.8	276.4	2,894.7	2,105.8	683.2	1,313.0	4,102.0	6,996.7
2011	1,163.9	228.2	855.3	188.6	21.4	158.8	246.4	2,862.5	1,955.1	694.2	1,278.1	3,927.3	6,789.8
2012	1,218.5	239.9	683.8	194.3	77.6	170.8	7.3	2,592.0	1,851.4	733.7	1,339.6	3,924.7	6,516.8
2013	1,004.5	231.3	823.8	191.4	93.5	182.4	0.0	2,526.9	1,662.2	623.8	1,006.8	3,292.8	5,819.7
2014	1,138.5	216.9	531.5	167.9	120.9	183.7	0.0	2,359.4	1,805.7	603.4	1,169.4	3,578.5	5,937.9
2015	866.0	188.3	516.3	144.1	34.6	138.1	0.0	1,887.5	1,436.9	538.0	967.6	2,942.5	4,830.0
2016	938.7	174.7	575.0	136.5	19.7	139.2	0.0	1,983.9	1,425.5	537.1	902.3	2,864.9	4,848.8
2017	823.4	175.3	701.2	141.8	80.5	133.9	0.0	2,056.1	1,439.8	492.7	827.8	2,760.3	4,816.4
2018	753.7	176.6	617.2	155.0	79.8	134.2	0.0	1,916.6	1,424.3	449.4	951.0	2,824.7	4,741.3
2019	584.7	144.2	358.9	132.6	82.8	138.0	0.0	1,441.2	1,475.2	417.3	951.1	2,843.6	4,284.8
2020[+]	386.9	115.9	473.5	138.0	83.6	77.2	0.0	1,275.1	1,273.8	400.3	611.7	2,285.8	3,560.9

Table 4. Total removals (harvest plus discards/release mortality) of Atlantic striped bass by sector in numbers of fish, 1990-2020. Note: Harvest is from state compliance reports/MRIP (July 8, 2021), discards/release mortality is from ASMFC. Estimates exclude inshore harvest from North Carolina.

Year	Commercial		Recreational		Total Removals
	Harvest	Discards*	Harvest	Release Mortality	
1990	93,888	47,859	578,897	442,811	1,163,455
1991	158,491	92,480	798,260	715,478	1,764,709
1992	256,476	193,281	869,779	937,611	2,257,147
1993	314,526	115,859	789,037	812,404	2,031,826
1994	325,401	166,105	1,055,523	1,360,872	2,907,900
1995	537,412	188,507	2,287,578	2,010,689	5,024,186
1996	854,102	257,749	2,487,422	2,600,526	6,199,800
1997	1,076,591	325,998	2,774,981	2,969,781	7,147,351
1998	1,215,219	347,343	2,915,390	3,259,133	7,737,085
1999	1,223,572	337,036	3,123,496	3,140,905	7,825,008
2000	1,216,812	209,329	3,802,477	3,044,203	8,272,820
2001	931,412	182,606	4,052,474	2,449,599	7,616,091
2002	928,085	199,770	4,005,084	2,792,200	7,925,139
2003	854,326	131,319	4,781,402	2,848,445	8,615,492
2004	879,768	157,724	4,553,027	3,665,234	9,255,753
2005	970,403	146,126	4,480,802	3,441,928	9,039,259
2006	1,047,648	158,808	4,883,961	4,812,332	10,902,750
2007	1,015,114	160,728	3,944,679	2,944,253	8,064,774
2008	1,027,837	106,791	4,381,186	2,391,200	7,907,013
2009	1,049,838	130,200	4,700,222	1,942,061	7,822,321
2010	1,031,430	134,817	5,388,440	1,760,759	8,315,446
2011	944,777	85,503	5,006,358	1,482,029	7,518,667
2012	870,684	198,911	4,046,299	1,847,880	6,963,774
2013	784,379	114,009	5,157,760	2,393,425	8,449,573
2014	750,263	111,753	4,033,746	2,172,342	7,068,103
2015	621,952	84,463	3,085,725	2,307,133	6,099,273
2016	609,028	88,171	3,500,434	2,981,430	7,179,063
2017	592,670	98,343	2,937,911	3,421,110	7,050,035
2018	621,123	100,646	2,244,765	2,826,667	5,793,201
2019	653,807	84,013	2,150,936	2,589,045	5,477,801
2020	577,363	65,319	1,709,973	2,760,231	5,112,886

* Commercial dead discard estimates are derived via a generalized additive model (GAM), and are therefore re-estimated for the entire time series when a new year of data is added.

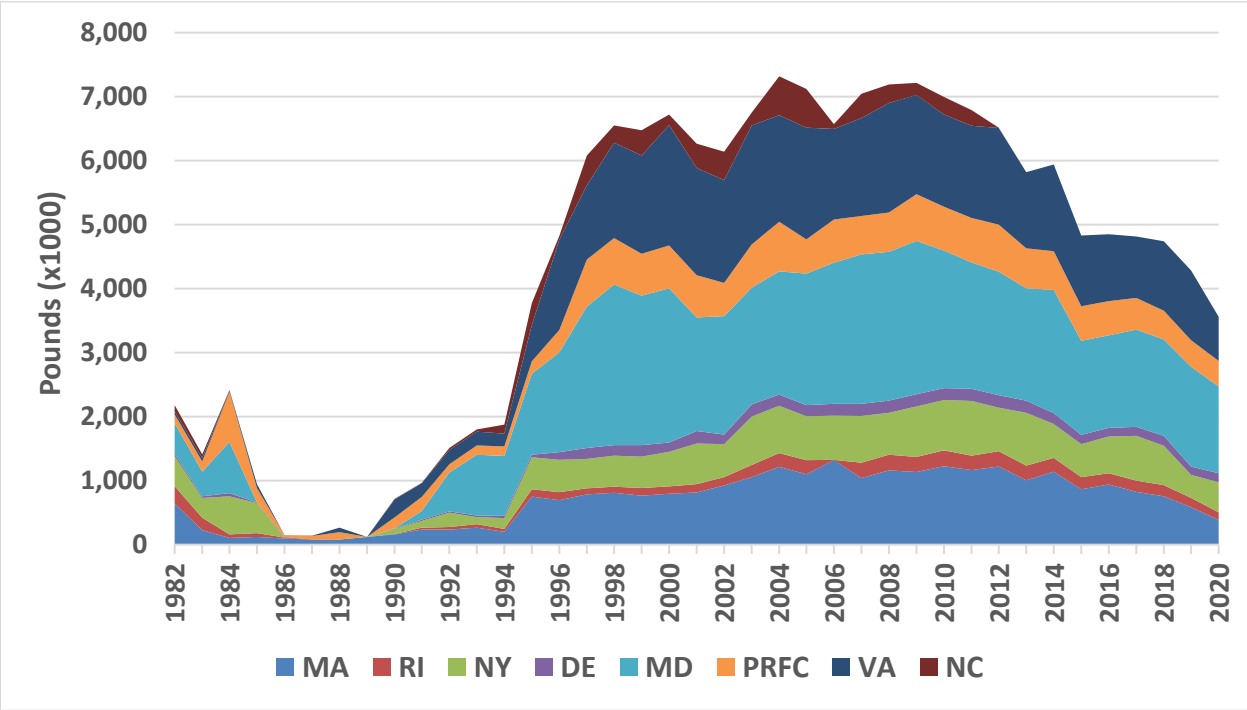
Table 5. Summary of Atlantic striped bass commercial regulations in 2020. Source: 2021 State Compliance Reports. Minimum sizes and slot size limits are in total length (TL). *Commercial quota reallocated to recreational bonus fish program.

STATE	SIZE LIMITS (TL) and TRIP LIMITS	SEASONAL QUOTA	OPEN SEASON
ME	Commercial fishing prohibited		
NH	Commercial fishing prohibited		
MA	≥35" minimum size; no gaffing undersized fish. 15 fish/day with commercial boat permit; 2 fish/day with rod and reel permit.	735,240 lbs. Hook & Line only.	6.24 until quota reached, Mondays and Wednesdays only. (In-season adjustment added Tuesdays effective Sept 1.) July 3rd, July 4th and Labor Day closed. Cape Cod Canal closed to commercial striped bass fishing.
RI	Floating fish trap: 26" minimum size unlimited possession limit until 70% of quota reached, then 500 lbs. per licensee per day	Total: 148,889 lbs., split 39:61 between the trap and general category. Gill netting prohibited.	4.1 – 12.31
	General category (mostly rod & reel): 34" min. 5 fish/vessel/day limit.		5.20-6.30, 7.1-12.31, or until quota reached. Closed Fridays, Saturdays, and Sundays during both seasons.
CT	Commercial fishing prohibited; bonus program in CT suspended indefinitely in 2020.		
NY	26"-38" size; (Hudson River closed to commercial harvest)	640,718 lbs. Pound Nets, Gill Nets (6-8"stretched mesh), Hook & Line.	6.1 – 12.15, or until quota reached. Limited entry permit only.
NJ*	Commercial fishing prohibited; bonus program: 1 fish at 24" to <28" slot size	215,912 lbs.	5.15 – 12.31 (permit required)
PA	Commercial fishing prohibited		

(Table 5 continued – Summary of commercial regulations in 2020).

STATE	SIZE LIMITS (TL) and TRIP LIMITS	SEASONAL QUOTA	OPEN SEASON
DE	Gill Net: 20" min in DE Bay/River during spring season. 28" in all other waters/seasons.	Gillnet: 135,350 lbs. No fixed nets in DE River.	Gillnet: 2.15-5.31 (2.15-3.30 for Nanticoke River) & 11.15-12.31; drift nets only 2.15-28 & 5.1-31; no trip limit.
	Hook and Line: 28" min	Hook and line: 7,124 lbs.	Hook and Line: 4.1–12.31, 200 lbs./day trip limit
MD	Chesapeake Bay and Rivers: 18–36" Common pool trip limits: Hook and Line - 250 lbs./license/week Gill Net - 300 lbs./license/week	1,445,394 lbs. (part of Bay-wide quota) – Initial quota 1,442,120 lbs. – Adjusted quota due to 2019 overage	Bay Pound Net: 6.1-12.31 Bay Haul Seine: 6.1-12.31 Bay Hook & Line: 6.4-12.31 Bay Drift Gill Net: 1.1-2.28, 12.1-12.31
	Ocean: 24" minimum	Ocean: 89,094 lbs.	1.1-5.31, 10.1-12.31
PRFC	18" min all year; 36" max 2.15–3.25	572,861 lbs. (part of Bay-wide quota)	Hook & Line: 1.1-3.25, 6.1-12.31 Pound Net & Other: 2.15-3.25, 6.1-12.15 Gill Net: 1.1-3.25, 11.9-12.31 Misc. Gear: 2.15-3.25, 6.1-12.15
VA	Bay and Rivers: 18" min; 28" max size limit 3.15–6.15	983,393 lbs. (part of Bay-wide quota)	1.16-12.31
	Ocean: 28" min	125,034 lbs.	
NC	Ocean: 28" min	295,495 lbs. (split between gear types).	Seine fishery was not opened Gill net fishery was not opened Trawl fishery was not opened

Figure 1. Commercial Atlantic striped bass landings by state in pounds, 1990-2020. Source: State compliance reports. Commercial harvest and sale prohibited in ME, NH, CT, and NJ. NC is ocean only.



Atlantic States Marine Fisheries Commission

1050 N. Highland Street • Suite 200A-N • Arlington, VA 22201
703.842.0740 • 703.842.0741 (fax) • www.asmfc.org

MEMORANDUM

TO: **Atlantic Striped Bass Management Board**

FROM: **Atlantic Striped Bass Plan Development Team**

DATE: **October 12, 2021**

SUBJECT: **Draft Addendum VII to Amendment 6**

At the direction of the Atlantic Striped Bass Management Board (Board), the Plan Development Team (PDT) drafted an addendum that considers options to allow for the voluntary transfer of the ocean region commercial quota between states that have ocean quota[1]. However, the PDT has significant concerns with adding ocean region commercial transfers to the fishery management program at this time. If the Board moves forward with public comment of Draft Addendum VII, it is recommended the below concerns are added to the Draft Addendum. The PDT notes these concerns were previously raised by the Technical Committee (TC) in 2014 when transfers were considered in Draft Addendum IV.

First, the PDT is concerned quota transfer could undermine the goals and objectives of the reductions taken under Addendum VI. The commercial ocean fishery has consistently underutilized quotas, due to a combination of fish availability and state-specific regulations (e.g. commercial prohibitions). Both Addenda IV and VI were designed to achieve a specific reduction in total removals through more restrictive recreational measures and reduced commercial quotas in order to achieve the fishing mortality target. During the Addendum VI process, the TC noted the reduction in commercial quota would achieve the necessary reduction in commercial removals only if the commercial fisheries perform as they have in the past, i.e., if they continue to underutilize their quotas to the same degree. This assumption would be violated if the transfer of commercial ocean region quota is permitted. If Addendum VI commercial quotas were fully utilized by allowing the transfer of latent quota, commercial harvest would be higher than estimated in the Addendum VI projections and states would not maintain the required commercial reduction, thus potentially undermining the goals and objectives of Addendum VI to end overfishing.

Second, a pound of commercial quota is not equal across all states. Through conservation equivalency (CE), states have been able to adjust their commercial size limits, which result in changes to their respective commercial quotas. For example, when implementing Addendum VI, Massachusetts increased its commercial minimum size limit, which increased its quota, and New York lowered its commercial slot limit minimum, which decreased its quota; both of these CE programs are based on a spawner-per-recruit analysis (SPR). Changes in state quota through CE have been occurring since before Addendum VI. Over time several adjustments have been made to commercial size limits resulting in changes to commercial quotas, making transferring quota between states with different size limits difficult. Since the PDT's focus has been on Draft Amendment 7, it has not had the time to consider all of the changes made to base quota allocations that have resulted from adjusting commercial size limits. Given more time, it might be able to address this concern.

[1] The Draft Addendum does not address potential transfers of the Chesapeake Bay quota among the Bay jurisdictions as the FMP does not establish the allocations of the Chesapeake Bay quota, rather Maryland, Virginia, and the Potomac River Fisheries Commission do so per the jurisdictions' mutual agreement. Additionally, the Draft Addendum does not consider allowing transfer of Chesapeake Bay quota to an ocean fishery (or vice versa) due to the distinct management programs between the areas (e.g., size limit differences).

Atlantic States Marine Fisheries Commission

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MEMORANDUM

April 15, 2022

To: **Atlantic Striped Bass Management Board**

From: **Tina Berger, Director of Communications**

RE: **Advisory Panel Nomination**

Please find attached a nomination to the Atlantic Striped Bass Advisory Panel – Jaime Lane, an estuarine and ocean gillnetter from North Carolina. Jaime replace Riley Williams on the Panel. While the question regarding criminal or federal fisheries violations was not checked on the AP nomination, NC Marine Patrol staff confirmed that Jaime has no fisheries violations.

Please review this nomination for action at the next Board meeting.

If you have any questions, please feel free to contact me at (703) 842-0749 or tberger@asmfc.org.

Enc.

cc: Emilie Franke

Atlantic Striped Bass Advisory Panel

Maine
David Pecci (rec)
144 Whiskeag Road
Bath, ME 04530
Phone (o): (207) 442-8581
Phone (c): (207) 841-1444
FAX: (207) 442-8581
dave@obsessioncharters.com
Appt. Confirmed 5/23/02
Appt Reconfirmed 5/10

Bob Humphrey (comm. rod and reel/for-hire)
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Pownal, ME 04069
Phone (day): 207.688.4966
Phone (eve): 207.688.4854
bob@bobhumphrey.com
Appt. Confirmed 2/18/20

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Phone (h): (603) 427-0401
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Appt. Confirmed 2/24/03
Appt Reconfirmed 5/10

Massachusetts
Douglas M. Amorello (comm. rod & reel)
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sashamysportfishing@gmail.com
Appt. Confirmed 3/23/11
Appt. Reconfirmed 8/18

Patrick Paquette (rec/for-hire/comm)
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Hyannis, MA 02601
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Email: basicpatrick@aol.com
Appt. Confirmed 8/16

Rhode Island
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Phone: 401.788.6012
Maridee2@gmail.com
Appt. Confirmed 2/3/21

Michael Plaia (comm/rec/for-hire)
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Makomike3333@yahoo.com
Appt. Confirmed 2/3/21

Connecticut
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Phone (eve): (860)739-8899
FAX: (860)739-9208
kyle@jbtackle.com
Appt. Confirmed 5/13/14

Vacancy (rec)

New York
Bob Danielson (rec)
86 Balin Avenue
South Setauket, NY 11720
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Bdan93@optonline.net
Appt. Confirmed 10/22/20

Vacancy (comm)

New Jersey
C. Louis Bassano, Chair
1725 West Central Avenue
Ortley Beach, New Jersey 08751
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FAX: (908) 241-6628
lbassano@comcast.net
Appt. Confirmed 10/15/01
Appt. Reconfirmed 2/9/06; 5/17/10; 4/14/14

Atlantic Striped Bass Advisory Panel

Eleanor A. Bochenek (retired fisheries scientists with experience in Mid-Atlantic rec. and comm fisheries)
117 Alexander Avenue
Villas, NJ 08251
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eboch@hsrl.rutgers.edu
Appt. Confirmed 11/5/21

Pennsylvania
Vacancy (rec)

Delaware
Leonard Voss, Jr. (com)
2854 Big Oak Road
Smyrna, DE 19977
Phone: (302) 653-7999
Appt. Confirmed 4/21/94
Appt. Reconfirmed 7/27/99; 7/03 and 7/07

Steven Smith (rec)
59 Burnham Lane
Dover, DE 19901
Phone (day): (302)744-9140
Phone (eve): (302)674-5186
smithbait@verizon.net
Appt. Confirmed 10/23/18

Maryland
Chris Dollar (outdoor columnist and fishing guide)
PO Box 367
Queenstown, MD 21658
Phone: 410.991.8486
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Appt. Confirmed 8/3/21

Charles E. Green Jr. (for –hire)
7327 Woodshire Avenue
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Appt. Confirmed 8/3/21

Virginia
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Appt. Confirmed 5/23/02
Appt Reconfirmed 5/06 and 5/10

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Appt Confirmed 5/5/21

Jamie Lane (estuarine and ocean gill net fisheries)
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Jlwinsl3@ncsu.edu

District of Columbia
Joe Fletcher (rec)
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Email: jmfletcher@verizon.net
Appt. Confirmed 10/30/95
Appt. Reconfirmed 9/15/99; 9/03 and 9/07

Potomac Fisheries River Comm.
Dennis Fleming (fishing guide; seafood processor/dealer)
P.O. Box 283
Newburg, MD 20664
Phone: 240.538.1260

Atlantic Striped Bass Advisory Panel

captaindennisf@gmail.com
Appt. Confirmed 2/3/21

ATLANTIC STATES MARINE FISHERIES COMMISSION

Advisory Panel Nomination Form

This form is designed to help nominate Advisors to the Commission's Species Advisory Panels. The information on the returned form will be provided to the Commission's relevant species management board or section. Please answer the questions in the categories (All Nominees, Commercial Fisherman, Charter/Headboat Captain, Recreational Fisherman, Dealer/Processor, or Other Interested Parties) that pertain to the nominee's experience. If the nominee fits into more than one category, answer the questions for all categories that fit the situation. **Also, please fill in the sections which pertain to All Nominees (pages 1 and 2). In addition, nominee signatures are required to verify the provided information (page 4), and Commissioner signatures are requested to verify Commissioner consensus (page 4). Please print and use a black pen.**

Form submitted by: Chris Batsavage (your name) State: NC

Name of Nominee: Jamie Lane

Address: 602 S Main Street

City, State, Zip: Robersonville, NC 27871

Please provide the appropriate numbers where the nominee can be reached:

Phone (day): 252-312-6832 Phone (evening): _____

FAX: _____ Email: jlwinsl3@ncsu.edu

. . . . . .

FOR ALL NOMINEES:

1. Please list, in order of preference, the Advisory Panel for which you are nominating the above person.
   1. Striped Bass
   2. _____
   3. _____
   4. _____

2. Has the nominee been found in violation of criminal or civil federal fishery law or regulation or convicted of any felony or crime over the last three years?

   yes_____ no_____

3. Is the nominee a member of any fishermen's organizations or clubs?

   yes _____ no X

   If "yes," please list them below by name.

4. What kinds (species) of fish and/or shellfish has the nominee fished for during the past year?

American Shad and Hickory Shad
Sea Mullet and Spanish Mackerel
Striped Bass
Spot and Croaker
Catfish
Flounder

5. What kinds (species) of fish and/or shellfish has the nominee fished for in the past?

all of the above plus:
Blue Crab

FOR COMMERCIAL FISHERMEN:

1. How many years has the nominee been the commercial fishing business? > 13 years
2. Is the nominee employed only in commercial fishing? yes _____ no X
3. What is the predominant gear type used by the nominee? Gill Nets
4. What is the predominant geographic area fished by the nominee (i.e., inshore, offshore)? inshore in rivers and sounds and in the ocean out to 3 miles

FOR CHARTER/HEADBOAT CAPTAINS:

1. How long has the nominee been employed in the charter/headboat business? _____ years
2. Is the nominee employed only in the charter/headboat industry? yes _____ no _____

   If "no," please list other type(s)of business(es) and/occupation(s): _____

3. How many years has the nominee lived in the home port community? _____ years

   If less than five years, please indicate the nominee's previous home port community.

FOR RECREATIONAL FISHERMEN:

1. How long has the nominee engaged in recreational fishing? _____ years

2. Is the nominee working, or has the nominee ever worked in any area related to the fishing industry? yes _____ no _____

   If "yes," please explain.

_____

_____

_____

FOR SEAFOOD PROCESSORS & DEALERS:

1. How long has the nominee been employed in the business of seafood processing/dealing? _____years

2. Is the nominee employed only in the business of seafood processing/dealing?

   yes _____ no _____ If "no," please list other type(s) of business(es) and/or occupation(s):

_____

_____

_____

3. How many years has the nominee lived in the home port community? _____ years

   If less than five years, please indicate the nominee's previous home port community.

_____

FOR OTHER INTERESTED PARTIES:

1. How long has the nominee been interested in fishing and/or fisheries management? _____ years

2. Is the nominee employed in the fishing business or the field of fisheries management? yes _____ no _____

   If "no," please list other type(s) of business(es) and/or occupation(s):

_____

_____

_____

FOR ALL NOMINEES:

In the space provided below, please provide the Commission with any additional information which you feel would assist us in making choosing new Advisors. You may use as many pages as needed.

While in college I began working on a commercial fishing vessel as a second part-time job in the summertime while I was home from school. I grew up about 20 minutes from the Albemarle Sound and Chowan River so it was a convenient way for me to get into an industry where I could merge making money with my love of being outdoors, my passion for science and also remain physically active in a challenging work environment. As I finished my degree I became more involved in commercial fishing and obtained a Standard Commercial Fishing License and a vessel. I then started procuring gear and ultimately learned to hang my own nets to save money. Over the years since that time, I have continued to participate in commercial fishing and have sought ways to diversify the types of fish I target, the gears that I use, and the areas I fish in. This has been done out of both financial need and to navigate the changing and tightening regulations. As part of that diversification process, I have also begun to participate in advisory panels/councils such as the NC DMF's Northern Region Advisory Panel and the MAFMC's River Herring and Shad Advisory Panel. I also submit public comments or participate in forums at times when the NC Marine Fisheries Commission is meeting and a topic of concern to me is on the table. I am applying for the ASMFC Advisory Committee for Striped Bass at this time because if I can have a positive impact on the regulatory changes made to the Striped Bass Fishery and how it impacts both myself and the commercial fishermen in my geographic area, I would like partake in that opportunity.

Nominee Signature: Jamie W. Lane Date: 03/02/2022

Name: Jamie Lane
(please print)

COMMISSIONERS SIGN-OFF (not required for non-traditional stakeholders)

Chris Batsavage
State Director

State Legislator

Governor's Appointee

Atlantic States Marine Fisheries Commission

ISFMP Policy Board

May 5, 2022
8:30 – 11:00 a.m. and 11:30 a.m.-12:00 p.m.
Hybrid Meeting

Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary. **Part of this meeting will be conducted with the Mid-Atlantic Fishery Management Council (MAFMC).**

1.	Welcome/Call to Order *(S. Woodward)*	8:30 a.m.
2.	Board Consent *(S. Woodward)* • Approval of Agenda • Approval of Proceedings from January 2022	8:30 a.m.
3.	Public Comment	8:35 a.m.
4.	Executive Committee Report (*S. Woodward*)	8:45 a.m.
5.	Consider Changes to the Appeals Policy (*R. Beal*) **Final Action**	9:00 a.m.
6.	Update on Mode Split Work Group (*R. Beal*)	9:15 a.m.
7.	Report from *De Minimis* Work Group (*T. Kerns*) **Possible Action**	9:25 a.m.
8.	Update on East Coast Climate Change Scenario Planning (*T. Kerns*)	9:45 a.m.
9.	Committee Reports • Law Enforcement Committee (*T. Kerns*)	9:55 a.m.
10.	NOAA Report on Sea Turtle Bycatch in Trawl Fisheries (*C. Upite*) • Review Stakeholder Outreach on Action to Develop Bycatch Reduction Measure to Reduce Sea Turtle Takes	10:05 a.m.
11.	Update on MAFMC's Consideration of Re-initiating the Research Set Aside Program (*R. Beal*)	10:35 a.m.
12.	Review Information Related to Tautog Commercial Tagging Program (*J. Boyle*)	10:45 a.m.
13.	Review Noncompliance Findings (If Necessary) **Action**	10:50 a.m.
14.	Other Business/Recess	10:55 a.m.

The meeting will be held at The Westin Crystal City (1800 Richmond Highway, Arlington, VA; 703.486.1111) and via webinar; click here for details

This part of the meeting will be conducted with the MAFMC

15. Reconvene with the MAFMC	11:30 a.m.
16. Initial Discussion on Commission Harvest Control Rule Draft Addenda and MAFMC Framework (*D. Colson Leaning, J. Beatty*)	11:30 a.m.
17. Adjourn	12:30 p.m.

The meeting will be held at The Westin Crystal City (1800 Richmond Highway, Arlington, VA; 703.486.1111) and via webinar; click here for details

MEETING OVERVIEW

ISFMP Policy Board
May 5, 2022
8:30 – 11:00 a.m. and 11:30 a.m. -12:30 p.m.
Hybrid Meeting

Chair: Spud Woodward (GA) Assumed Chairmanship: 10/21	Vice Chair: Joe Cimino (NJ)	Previous Board Meeting: January 27, 2022
Voting Members: ME, NH, MA, RI, CT, NY, NJ, PA, DE, MD, DC, PRFC, VA, NC, SC, GA, FL, NMFS, USFWS (19 votes)		

2. Board Consent

- Approval of Agenda
- Approval of Proceedings from January 27, 2022

3. Public Comment – At the beginning of the meeting public comment will be taken on items not on the agenda. Individuals that wish to speak at this time must sign-in at the beginning of the meeting. For agenda items that have already gone out for public hearing and/or have had a public comment period that has closed, the Board Chair may determine that additional public comment will not provide additional information. In this circumstance the Chair will not allow additional public comment on an issue. For agenda items that the public has not had a chance to provide input, the Board Chair may allow limited opportunity for comment. The Board Chair has the discretion to limit the number of speakers and/or the length of each comment.

4. Executive Committee Report (8:45-9:00 a.m.)

Background

- The Executive Committee will meet on May 4, 2022

Presentations

- S. Woodward will provide an update of the Executive Committee's work

Board action for consideration at this meeting

- none

5. Consider Changes to the Appeal Process Final Action (9:00-9:15 a.m.)

Background

- The ISFMP Charter includes an opportunity for a state to appeal species management board decisions. A process was implemented in 2003 and revised to clarify appeal criteria.
- After the 2021 appeal decision regarding black sea bass commercial allocation, it was suggested additional improvements to the process may be appropriate.
- The Executive Committee has discussed and drafted a revised Appeals Process (**see Executive Committee Briefing Materials**).

Presentations

- R. Beal will present the revised Appeals Process

Board action for consideration at this meeting

- Approve the revised Appeals Process

6. Update on Mode Split Work Group (9:15-9:25 a.m.)

Background

- Recreational fisheries are generally divided into three modes: shore, private anglers and for-hire fisheries. At times, these three modes have different preferred management programs and these differences are highlighted when management reductions are necessary.
- The Commission does not have a policy on recreational mode splits. The Policy Board established the Mode Split Work Group, which is considering if a policy should be established that would to guide consideration of future mode splits rather than having the species management boards deciding independently.

Presentations

- R. Beal will present the Mode Split Work Group progress

Board action for consideration at this meeting

- none

7. Report from De Minimus Work Group Possible Action (9:25-9:45 a.m.)

Background

- The Commission includes de minimis provisions in interstate FMPs to reduce the management burden for states that have a negligible effect on the conservation of a species. The de minimis provisions in FMPs vary by species and include a range of requirements for management measures, reporting requirements, and de minimis qualification periods.
- Past Policy Board de minimis discussions focused on the balance between standardization across FMPs and the flexibility for the species management boards in developing de minimis provisions.
- The Policy Board tasked a Work Group to provide a recommendation for addressing de minimis that addresses the concerns raised by the Board.

Presentations

- T. Kerns will present the Work Group Report (**Supplemental Materials**)

Board action for consideration at this meeting

- Consider Work Group Recommendations

8. Update on East Coast Climate Change Scenario Planning Initiative (9:45-9:55 a.m.)

Background

- In November 2020, the Northeast Region Coordinating Council (NRCC) initiated a region-wide scenario planning initiative. Through this East Coast Climate Change Scenario Planning Initiative, fishery managers and scientists are working collaboratively to explore jurisdictional and governance issues related to climate change and shifting fishery stocks.

- The specific focus of this scenario project is (i) to assess how climate change might affect stock distribution, availability and other aspects of east coast marine fisheries over the next 20 years, and (ii) to identify what this means for effective future governance and fisheries management.
- A scoping process was conducted in August-September 2021 to introduce the initiative to stakeholders, to seek input on the draft project objectives, and to solicit input from stakeholders on factors and issues that might shape the future of East Coast fisheries. Scoping consisted of a series of three kick-off webinars and an online questionnaire. A summary of the scoping process and input received can be found here.
- The Exploration Phase was conducted this spring, where three webinars were held that focused on identifying and analyzing the major drivers of change in depth. The outcomes of these webinars will form the "building blocks" for the June scenario creation workshop.

Presentations

- T. Kerns will provide an update of the initiative

Board action for consideration at this meeting

- None

9. Committee Reports (9:55-10:05 a.m.)

Background

- The Law Enforcement Committee (LEC) will be meeting on May 4th

Presentations

- T. Kerns will provide an update of the LEC's work

Board action for consideration at this meeting

- None

10. NOAA Report on Sea Turtle Bycatch in Trawl Fisheries (10:05-10:35 a.m.)

Background

- NOAA Fisheries has been considering ways to reduce sea turtle bycatch in several trawl fisheries in the Greater Atlantic Region, including summer flounder, longfin squid, and Atlantic croaker. Research with the industry on various gear modifications that could reduce turtle mortality has been ongoing for several years.
- Over the last several months, NOAA has conducted a series of outreach efforts to obtain public input on sea turtle bycatch in trawl fisheries and measures under consideration.
- NOAA will be sharing the public input received and next steps, and request additional Commission feedback (**Briefing Materials**)

Presentations

- C. Upite will present the report

Board action for consideration at this meeting

- Determine if the Commission will provide public comment on the report

11. Update on the MAFMC's Consideration of Re-initiating the Research Set Aside (RSA) Program (10:35-10:45 a.m.)

- In 2021 and 2022 the MAFMC hosted four workshops that explored the possible redevelopment of the RSA program. The goal was to develop recommendations regarding whether and how the RSA program should be redeveloped. (See this page for background on the history and current status of the RSA program.)
- Each of the first three workshops targeted a separate topic related to RSA: Research, Funding, and Enforcement. The Scientific and Statistical Committee (SSC) Economic Working Group worked collaboratively with the Council's Research Steering Committee (RSC) to provide economic input specific to each topic. During the fourth workshop, participants reviewed the outcomes from the first three webinars and developed final recommendations for RSA program redevelopment (**Briefing Materials**).

Presentations

- R. Beal will present a summary of the recommendations for RSA redevelopment

Board action for consideration at this meeting

- none

12. Review Information Related to Tautog Commercial Tagging Program (10:45-10:50 a.m.)

Background

- The commercial harvest tagging program was fully implemented by all states in 2021. At the January meeting, the Tautog Board received public comments from the commercial Industry relating to issues with the commercial tagging program and fish health.
- The Tautog Board requested staff to conduct a survey of tautog dealers to evaluate potential effects on the tautog market price. Staff has only received feedback from 3 dealers in two states (RI and MA) that sell live tautog.
- New York State also conducted a survey of tautog dealers and harvesters to evaluate the response to the commercial tagging program within their jurisdiction **(Supplemental Materials)**.

Presentations

- Findings of tautog dealers and harvesters survey by J. Boyle

Board Guidance at this meeting

- Seek feedback from states to gather input from dealers in other states that sell live tautog

13. Review Non-Compliance Findings, if Necessary Action

14. Other Business/Recess

15. Reconvene with the MAFMC

16. Initial Discussion on Commission Harvest Control Rule Draft Addenda and MAFMC Framework (11:30 a.m.-12:30 p.m.)

Background

- After reviewing nine topics that were either recommended by the Recreational Management Reform Initiative Steering Committee or by stakeholders through scoping for two separate ongoing amendments, the Council and Board agreed to initiate a framework/addendum and an amendment to address several recreational issues. During the February 2021 meeting, the Council and Policy Board prioritized

development of the harvest control Rule as the first step in addressing recreational reform.

- A joint Plan Development Team (PDT) and Fishery Management Action Team (FMAT) developed the Recreational Harvest Control Rule Framework/Addendum as part of the Recreational Reform Initiative. The Board and Council approved their respective documents for public comment in February. The Commission conducted public hearings in March and April and public comment closed on April 22, 2022 on its Addendum.
- Staff is summarizing the public comment and will provide a full summary at the June meeting of the Council and Board.

Presentations

- Staff will present a high level overview of comments from the public hearings

Board action for consideration at this meeting

- None

16. Adjourn

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

ISFMP POLICY BOARD

Webinar
January 27, 2022

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ATTENDANCE

Board Members

Pat Keliher, ME (AA)
Cheri Patterson, NH (AA)
Ritchie White, NH (GA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)
Dan McKiernan, MA (AA)
Raymond Kane, MA (GA)
Jason McNamee, RI (AA)
David Borden, RI (GA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
Justin Davis, CT (AA)
Bill Hyatt, CT (GA)
Jim Gilmore, NY (AA)
Emerson Hasbrouck, NY (GA)
Joe Cimino, NJ (AA)
Tom Fote, NJ (GA)
Kris Kuhn, PA, proxy for T. Schaeffer (AA)
Loren Lustig, PA (GA)
Warren Elliott, PA (LA)
John Clark, DE (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Russell Dize, MD (GA)
Pat Geer, VA, Administrative proxy
Bryan Plumlee, VA (GA)
Shanna Madsen, VA, proxy for Sen. Mason (LA)
Kathy Rawls, NC (AA)
Jerry Mannen, NC (GA)
Bill Gorham, NC, proxy for Rep. Steinberg (LA)
Mel Bell, SC (AA)
Doug Haymans, GA (AA)
Spud Woodward, GA (GA)
Erika Burgess, FL, proxy for J. McCawley (AA)
Marty Gary, PRFC
Karen Abrams, NMFS
Lowell Whitney, US FWS

(AA = Administrative Appointee; GA = Governor Appointee; LA = Legislative Appointee)

Staff

Robert Beal
Toni Kerns
Tina Berger
Laura Leach
Lisa Carty
Maya Drzewicki
Kristen Anstead
James Boyle
Pat Campfield
Emilie Franke
Lisa Havel
Chris Jacobs
Jeff Kipp
Dustin Colson Leaning
Adam Lee
Kirby Rootes-Murdy
Sarah Murray
Caitlin Starks
Anna-Mai Svajdlenka
Deke Tompkins

Guests

Mike Armstrong, MA DMF
Pat Augustine, Coram, NY
Jason Avila, Avila Global
Alan Bianchi, NC DENR
Mike Celestino, NJ DEP
Heather Corbett, NJ DEP
Jessica Daher, NJ DEP
Peter Fallon, Maine Stripers
Lynn Fegley, MD DNR
Cynthia Ferrio, NOAA
Anthony Friedrich, SGA
Alexa Galvan, VMRC
Lewis Gillingham, VMRC
Saverio Governale, NYS DEC
Hannah Hart, FL FWC
Jay Hermsen, NOAA
Emily Keiley, NOAA
Kathy Knowlton, GA DNR
Aaron Kornbluth, PEW Trusts
Wilson Laney
Nils Larson
Kyle Lewis
Tom Lilly
Brooke Lowman, VMRC
Mike Luisi, MD DNR
Chip Lynch, NOAA
Steve Meyers
Chris Moore, MAFMC
Allison Murphy, NOAA
Brian Neilan, NJ DEP

Guests (continued)

Adam Nowalsky, Port Republic, NJ
Derek Orner, NOAA
Willow Patten, NC DENR
Nicholas Popoff, FL FWS
Will Poston, SGA
Lenny Rudow
Tara Scott, NOAA
Melissa Smith, ME DMR
David Stormer, DE DFW
Mike Waine, ASA
Kelly Whitmore, MA DMF
Angel Willey, MD DNR
Chris Wright, NOAA
Erik Zlokovitz, MD DNR
Renee Zobel, NH FGD

The ISFMP Policy Board of the Atlantic States Marine Fisheries Commission convened via webinar; Thursday, January 27, 2022, and was called to order at 1:00 p.m. by Chair A.G. "Spud" Woodward.

CALL TO ORDER

CHAIR A.G. "SPUD" WOODWARD: Good afternoon, everyone. I'll call today's meeting of the ISFMP Policy Board to order. Before I get into the formalities, I want to take a few moments to thank some folks. First, he's not here, but we want to thank Steve Bowman for his long service to the Commission. We're sure he really missed today's meeting on menhaden. I'm surprised he wasn't there in the audience. Steve has done a great job, and we'll certainly miss him.

We also have another longstanding stalwart of the Commission who is going to be leaving us, and that's Mike Millard, who will be retiring. Mike has been with us at least a couple of decades, and has done a real good job representing the Service, and has always been a good, rational calm voice in the middle of some of our contentious deliberations. We certainly want to wish Mike the best. Mike, I'll certainly allow you to make some comments if you would like to, raise your hand.

MR. MIKE MILLARD: Thank you, Spud. Real brief, Kirby had a lot of nice things to say about everyone, and I certainly echo his comments, it's as fine a bunch of professionals as I've ever worked with. Thanks for the kind words, and you may see me in the back of the room sometime.

CHAIR WOODWARD: Thanks, Mike, we certainly wish you the best. Speaking of Kirby, I certainly want to take the opportunity to personally thank him for all the support he's given me in my many years with the Commission. He'll be missed, a lot of folks have commented about him, but he's gone, but I have a feeling we'll be seeing him again.

Also, Savannah Lewis, for some strange reason decided to follow her husband and go to balmy Hawaii, instead of staying in metro D.C. I can't imagine why. Who would want to do something like that? I want to thank her for her service. At this point, I want to give Toni an opportunity to introduce some of our newest staffers who are going to be taking over duties of the Commission.

MS. TONI KERNS: Thanks, Mr. Chairman, and you'll receive an e-mail from me about all of this. But just to quickly point out a couple of things. We have hired two new staff members. The first one is James Boyle, he is actually on the webinar right now, and if we haven't scared him away, he will be taking over menhaden. James has hailed to us from his recent graduation out of the University of Miami. From graduate school he did his undergrad at University of Emery, and has a background in coral restoration and advocacy through different diving programs. Then in February, Tracy Bauer will be joining the Commission's ISFMP team.

We will be stealing her from North Carolina DMF. She did her undergraduate degree at UNC Wilmington, and her graduate program at the University of New England, and she's been with the state of North Carolina for the past six years. We're excited to have both of them join the team and get to know everybody. Then I also just wanted to make the announcement that Caitlin Starks is our new Senior FMP Coordinator at the Commission, and I am looking forward to working with Caitlin in this new role of hers.

CHAIR WOODWARD: Thanks, Toni, we certainly look forward to working with our new folks and congratulations, Caitlin. We look forward to working with you in your new role.

APPROVAL OF AGENDA

CHAIR WOODWARD: At this point we've got an agenda for this afternoon's meeting. Are there any requested additions to the agenda? If so, raise your hand. Any hands, Toni?

MS. KERNS: No hands.

CHAIR WOODWARD: Is there any opposition to accepting the agenda as presented?

MS. KERNS: No hands in opposition.

CHAIR WOODWARD: Then we'll consider it adopted by unanimous consent.

APPROVAL OF PROCEEDINGS

CHAIR WOODWARD: We also have in the briefing materials proceedings from the October 2021 meeting of the Policy Board. Are there any necessary edits, modifications, changes to that?

MS. KERNS: I have no hands raised.

CHAIR WOODWARD: Is there any opposition to accepting it as presented?

MS. KERNS: No opposition.

CHAIR WOODWARD: All right, then we'll consider the Proceedings adopted by unanimous consent.

EXECUTIVE COMMITTEE REPORT

CHAIR WOODWARD: The Executive Committee met on the morning of January 26, after approval of a modified agenda, and the summary from the October 2021 meeting. We had a lengthy discussion about the role of the Commission in offshore wind energy along the Atlantic Coast.

Several members endorsed the concept of Commission involvement for the following purposes, and this is certainly not a fully exhaustive list, but this was just some of the themes that came out during the discussion. Improved and timely sharing of information about processes and procedures related to siting, leasing, construction and operation.

Providing subject matter expertise regarding its conservation data and information used to evaluate environmental, social, and economic impacts. Evaluation of how siting event and structure might adversely affect fisheries independent surveys. Development of consistent approaches for mitigation and compensation. Advocacy for federal policy development and/or modification thereof that protects states interest. Evaluation of offshore wind energy in the larger context of marine spatial planning. The leadership and staff are going to develop a draft scope of work with an associated analysis of the capacity of the Commission to complete a scope of work, and we'll bring that back to the Ex-Com for further consideration in the future. Any questions about that segment of our meeting before I move on?

MS. KERNS: No hands.

CHAIR WOODWARD: Then Executive Director Beal presented information on member state responses to the need for unused CARES 1 funds. A unanimous decision was made to make available unspent funds to states that have further needs, with the goal of zeroing out the remaining CARES 1 balance for the deadline of June 30, 2022.

The details of the Ex-Com's decision will be forwarded to NOAA Fisheries for approval prior to implementation. But this decision does not set a precedent for how any unused funds for Tier 2 will be allocated or spent. Executive Director Beal presented the draft provisions to the Appeals Process Policy.

The ensuing discussion identified the need for further modification to policy to reflect concerns of some members. The draft revised policy will be discussed at a future Ex-Com meeting. The use of alternates for Advisory Panel members was briefly discussed. Commission rules and regulations do allow for the appointment of alternates.

Therefore, member delegations are encouraged to appoint alternates to serve when a primary AP member is unavailable. Our last issue was a discussion of the near-term workload of the Commission. It's possible that we may need to have as many as four public meetings. Obviously, that

has changed as a result of this morning's meeting of the Menhaden Board.

But we're still looking at the possibility of three documents that have to be brought out to the public for comment, and given the fact we've got a couple of new staff members and other factors, that is creating a bit of a strain on the workload. We talked about some possible mitigative measures at the Ex-Com, which included changing the timeline for some of these FMP actions.

We're possibly having some board actions originally scheduled for the May meeting to occur at a meeting held in June. We've still got three that we're going to have to deal with, so we've got a little bit of a strain. I certainly want to open it up to the Policy Board, for any suggestions on how we might alleviate some of that.

MS. KERNS: We have Roy Miller and Pat Keliher.

CHAIR WOODWARD: All right, go ahead, Roy.

MR. ROY W. MILLER: I was wondering if I could ask a question regarding the first item you brought up, well the second item, the unused CARES funding.

CHAIR WOODWARD: Sure, go ahead.

MR. MILLER: At a previous Executive Committee meeting, there was a suggestion offered, I think it was from Pat Geer, that the Commission look into using leftover funds to reimburse the Commission for losses incurred as a result of canceling meeting arrangements. I'm just curious as to whether anyone on the Commission pursued that, and if so, have we gotten an answer back?

CHAIR WOODWARD: We didn't specifically address that. I know we did discuss how to possibly increase reimbursements back to the Full Commission for administration in CARES 1, and the general discussion focused around the need to really try to get as much of that money out to the members states or the eligible party as possible. I'll bounce that back to you, Bob, and Laura if she's on, to address Roy's question.

EXECUTIVE DIRECTOR ROBERT E. BEAL: Thank you, Mr. Chair, I'll take a shot at it first, then Laura can fill in details if I miss any. Yes, Roy, you know we had talked about that at the staff level, Laura and I in particular. We're in a financial spot where we could pay the meeting penalties for not meeting.

We felt it was equally as important if not more important to get the CARES Act money out to individuals that still needed assistance. A number of states identified that they couldn't fully reimburse people or make people fully whole, you know based on the funding that was available under CARES 1. In this iteration we decided not to pursue meeting reimbursement.

However, there likely will be this similar discussion at the end of CARES 2, once the states have allocated everything they can allocate, and we'll be able to pursue potentially more overhead at ASMFC, if that's appropriate, and/or reimbursement for loss meeting expenses because of COVID. We didn't do it this round, just so that we could make sure as much money as possible was going out to stakeholders that needed it, and we still have a placeholder for CARES 2, where we can look into it if we need to.

MR. MILLER: Thank you.

CHAIR WOODWARD: Yes, thanks, Bob, any follow up on that, Roy? Are you good? All right, go ahead, Pat.

MR. PATRICK C. KELIHER: I got distracted there for a second. Either yesterday we did have a quick conversation on workload concerns. I'm not sure those are necessarily fully alleviated by the conversations at Menhaden today, but with Menhaden, Striped Bass and Lobster, I think we've got a situation still, where workload is a problem.

Beyond that, from the Lobster perspective, now that we've had time to go back and think about the existing motions that were passed regarding approval of a public hearing document for lobster.

We've got a time constraint issue here in Maine, so I do have a motion prepared if staff wanted to put it up, and read it into the record. If I get a second, I could give further rationale, because I think it would certainly help the state of Maine, but I think it may help with workload as well.

CHAIR WOODWARD: Go ahead, read that into the record, Pat.

MR. KELIHER: I move that the ISFMP Policy Board delay further action on Draft Addendum XXVII to Amendment 3 to the American Lobster Fishery Management Plan, to move back the public hearings to June 2022. The delay of final action on this FMP is to ensure that the public hearings can include a presentation on the 2021 stock status.

Ensure that the Lobster Board has a better understanding of current or new right whale rules that could benefit the resiliency of the lobster stock, and to allow for possible changes in the current COVID situation to allow states that will need to hold in-person scoping meetings ahead of any commission public hearings. If I get a second, I can give some further rationale.

CHAIR WOODWARD: Do we have a second? If so, please raise your hand.

MS. KERNS: We have a couple, and I'll start with Dan McKiernan, Ritchie White, Cheri Patterson and Dennis Abbot.

CHAIR WOODWARD: All right, it sounds like you've got your seconds covered there, Pat, so if you want to go ahead and elaborate a little more on the motion, proceed.

MR. KELIHER: Yes, I'll try to be brief here, Mr. Chairman, because I think a lot of the rationale is in the body of the motion. I don't have to tell anybody the importance of the lobster fishery to the state of Maine. It's a billion-dollar fishery, one of the biggest in the country. We're in a period right now of very high COVID infection rates, just like the rest of the country.

It's really impacting the way we're doing business, and for the issues such as this, it has such an importance to this industry. I think it behooves both the state of Maine and the Commission to give us some time to have face-to-face meetings with the industry, so they are well aware of the situations that face them.

Again, I think it will also give time for the TC to compile all the 2021 stock information, which will be critical in presenting at the public hearings. You know we have the right whale issue. We've got new right whale rules in place. We've got further conversations at the TRT happening that could bring additional risk reductions sooner than what is laid out within the Biological Opinion.

Then we have a wildcard of what's going on in the courts down in the D.C. circuit, with two different lawsuits in play, and potentially a third now with Max Strahan. We don't know how those will impact the industry, but it's a wildcard, and by having some delays until later in the year for any final action. It would certainly give us some additional information that may actually show some benefit to the stock resiliency that we're looking for. I'll end it with that, Mr. Chairman.

CHAIR WOODWARD: Any of the individuals that raised their hand for a second like to make a comment about this motion?

MS. KERNS: I have no hands. Sorry, Spud, David Borden.

CHAIR WOODWARD: Go ahead, David.

MR. DAVID V. BORDEN: I guess my question is to Pat. Is it your intent that we will proceed with

public hearings at that stage, or will we have to know the results of all of these different issues you've identified? I just state before you answer, that if it's the latter, we're probably going to have to delay this whole issue beyond that date, because it's highly unlikely that all of these issues will be clarified by the groups that are involved in them.

MR. KELIHER: Yes, thanks for that question, Dave. I agree, it wouldn't be the latter. I think what I'm looking for really predominantly is breathing room to hold some hearings, or scoping meetings if you will, ahead of public hearings. I would think though, I think we will have not all, but potentially some of the information by an August meeting.

Based on some of the timelines, both in court, and we know we've got in 2025, an additional 60 percent reduction coming in 2025 that will certainly change the nature of the lobster fishery beyond what we know it now. But that's down the road. It would certainly give an opportunity for us to understand what's happening in the courts.

MR. BORDEN: Mr. Chairman, can I follow up?

CHAIR WOODWARD: Go right ahead, Dave.

MR. BORDEN: I'm supportive of this concept, but I have to confess that I'm wary about a delay in this, and I think Pat probably shares this concern. The whole intent of this Addendum was to put in place a mechanism that would give us a detailed footprint for the industry before the industry gets confronted with a lot of these development projects for federal waters.

It's a precautionary action. If it gets delayed, and we don't implement the trackers in 2023, as we proposed, we're going to end up losing a whole year of data, and those development projects are going to go forward, and we don't want that to happen. I don't think anybody wants that to happen. I would just urge everybody to keep that in mind, when we reflect on the timelines.

MR. KELIHER: David, I do share that concern, and Mr. Chairman, if I may.

CHAIR WOODWARD: Go ahead.

MR. KELIHER: I do share those concerns, David. None of this is related to the tracker addendum. I think we'll have, hopefully the states will be able to compile those questions and get them to Caitlin, ahead of the special board meeting that is being scheduled, and hopefully we could potentially be on track for that timing. I don't want the Policy Board to confuse this with the Tracker Addendum.

MR. BORDEN: Okay, thank you. They do get conflated, let's put it that way.

MR. KELIHER: I agree they do, thank you. I think it's good that you brought it up for clarity.

CHAIR WOODWARD: I think the second to this motion was Dan McKiernan. I think that was the first name that was read off by Toni.

MS. KERNS: That is correct.

CHAIR WOODWARD: Any further discussion?

MS. KERNS: Dan actually has his hand up.

CHAIR WOODWARD: All right, go ahead, Dan.

MR. DANIEL McKIERNAN: I agree with Pat and with David, especially Pat's desire to have some in-person meetings with some of the industry part of the public hearings. I support that. Many of the items that Pat mentioned, we don't have control over. But one that we might have control over would be the calculation of the new Index that is part of this proposed Addendum, which are the survey-specific values that the Board will be approving, as to one or the other, depending on the decline in that Index.

I'm wondering if we do go with a slight delay, if through the Plan Coordinator, if we could get the TC to reveal some of those values, so that when we do go to public hearing, we'll be able to have a fresh value for the stock index, and that index is a combination of ventless trap surveys and the other trawl surveys. I guess that's a question for maybe Toni and Caitlin at this time.

CHAIR WOODWARD: Yes, Toni, Caitlin, do you all want to respond to that?

MS. KERNS: I'm going to have Caitlin respond. Go ahead, Caitlin.

MS. CAITLIN STARKS: Yes, I'm here. I think it's completely reasonable to ask the TC to start working on calculating the Index with the newest data, as we discussed during the Lobster Board meeting. I think there is a good chance that the data will be available before May, so I think we can definitely work towards that.

CHAIR WOODWARD: Any further discussion on the motion?

MS. KERNS: Mr. Chairman, just to be clear then, just for process wise. We would hold the hearings in June, maybe a little of July, and then we would bring that public comment back to the Board for their consideration in August. Just so everyone is on the same page.

CHAIR WOODWARD: I believe that is the intent of the motion, but I'll defer to the maker and seconder to confirm that.

CHAIR KELIHER: I agree, that is the intent.

MR. McKIERNAN: I agree as well.

CHAIR WOODWARD: Very good. No further discussion, is there any opposition to the motion?

MS. KERNS: I have no hands raised.

CHAIR WOODWARD: I guess any abstentions or nulls or anything like that?

MS. KERNS: I have no hands raised.

CHAIR WOODWARD: Very good, all right, motion carries unanimously. Thanks very much. Any additional questions about my Executive Committee Report?

MS. KERNS: I have no hands raised.

REPORT ON THE 2021 COMMISSIONER SURVEY

CHAIR WOODWARD: All right, with that we'll move on to our next agenda item, and I'm going to turn it over to Deke for a report on the 2021 Commissioner Survey.

MR. DEKE TOMPKINS: Thanks, Spud. Thank you to the gentleman from the great state of Georgia. I am now going to summarize the result of the survey of 2021 ASMFC Progress. The Survey of Commission Progress was initiated in 2009, to evaluate commission progress. It examines a broad range of issues related to the 2019 through 2023 Strategic Plan and Annual Action Plan, and it's comprised of 16 rating questions and 5 comment questions.

The 2021 data was collected from December 6, 2021 to January 6, 2022, and as you can see here, 28 Commissioners or proxies responded this year. Here we can see the average across all scores throughout the time series. Overall, there is not a lot of variation from year to year, with scores ranging only about 1 point through the time series.

The average score across all years is 7.73, and this year's score was slightly above that at 7.79. For this year's presentation, I'll attempt to frame the results, not as a single data point for 2021, but to also add some context using the past three years, so we can kind of get a picture of where things are going.

The 15 rating questions comprised 5 categories. The scores for all 5 categories were relatively stable

this year, with an evident increase in the progress category. Next, I'll run through the results for each category. Questions 1 and 2 evaluate progress to the Commission's vision, Sustainably Managing Atlantic Coastal Fisheries.

The values in parentheses represent the 1- and 3-year score changes. Scores from Questions 1 or 2 have been closely related throughout the time series with a correlation coefficient of 0.89. The second category is execution and results, and these questions focus on cooperation within and without the Commission, and securing resources.

There has been a negative trend for cooperating internally and with federal and constituent partners over the past three years. Scores for securing resources have been rising since 2016. The third category focuses on overfishing and managing rebuilt stocks, as well as engaging lawmakers. There is a positive three-year trend in responses to overfishing as a metric of Commission progress and managing rebuilt stocks. Conversely, managing rebuilt stocks and legislative engagement have shown a negative trend since 2019. The fourth category considers human and fiscal resources, as well as reacting to new information.

Question 11, Resource Utilization, had the highest average score throughout the time series. Great job, Laura, with an all-time high in 2020. Question 12, Reacting to New Information, saw the greatest increase among all questions in the past three years. Scores for Resource Allocation on issues that can be influenced by the Commission, has been essentially flat since 2019.

The fifth and last category rates the Commission products, ISFMP, Science and ACCSP. These questions rank in the top four highest scores throughout the time series. Now I'll move on to the five open-ended questions, and I would note that there is a lot of consistencies in these responses from year to year.

First up is Obstacles to Rebuilding Managed Stocks, and one of the major themes from this question surrounded cooperation between states among Commissioners, NOAA Fisheries and the Councils. There were also multiple comments on social economic implications of management decisions, and challenges related to climate change.

All of those concepts have been mentioned frequently in past iterations of this survey. Question 18 asked respondents which commission products were most useful. There were a lot of positive responses here, and I'll mention specifically meeting week materials, ISFMP and science outputs, the website, Annual Report, and Public Comment summary.

Question 19 responses were similar to past years, but I would note there was interest in getting back to in-person meetings, increased engagement with ACCSP, more information from the Law Enforcement Committee, and one Commissioner commented about access to software and licenses. Question 20, as usual there was a wide array of issues flagged as needing increased focus.

I think I got almost all of them here in some shape or form. Some of the themes include allocation, reallocation, recreational management, climate change, internal and external cooperation, securing resources, social impacts of management decisions, and improving fisheries independent and dependent data collection.

Menhaden, right whales and meeting rules were also mentioned. Under additional comments we heard again about allocation, climate change, working with the Councils and in-person meetings. One respondent also mentioned concerns about the appeals process. Thanks, Mr. Chairman, and I yield back the balance of my time.

CHAIR WOODWARD: Thank you, Deke, that was a great presentation. The survey is something that, I mean obviously he would love to see 100 percent participation. Hopefully we'll continue to strive towards that in the future. It is an opportunity to help give leadership and staff the input they need,

to make sure that the machine that is the Commission is moving n the right direction, and firing on all cylinders. Any questions for Deke on his presentation?

MS. KERNS: We have John Clark.

CHAIR WOODWARD: Go ahead, John.

MR. JOHN CLARK: Thank you for the presentation, Deke. I was just curious seeing the numbers never seem to exceed the high 30s, and we're down in the 20s of respondents this year. Are you getting a response, at least one response from every state, or is this concentrated in one region or the other?

MR. TOMPKINS: Thanks for the response, John. It's a little hard to tell, because the survey is anonymous, so short answer is no. I don't have a really geographical breakdown of who responded.

MR. CLARK: Right, I just thought, aren't we supposed to shoot you an e-mail to let you know we've done the survey? I didn't know whether you tracked those or not. Thanks.

MR. TOMPKINS: Yes, I do keep track of that. I would say about a third of the people who fill out the survey e-mail me though, so it's still pretty hard to know who filled out the survey. Like, I got about 12 or 15 e-mails that the survey was completed, but 28 responses.

MR. CLARK: That explains it, thanks.

CHAIR WOODWARD: Yes, once again it's uncertainty in the data. Seems like that's our perpetual nightmare, isn't it? Certainly, those of you who are responding, we appreciate it. Please, ask others to do likewise. They may seem just some other boring numbers, but it is good feedback for leadership and for staff. It's certainly worth the few minutes of time it takes to do it. Anyone else, question or comment about the survey?

MS. KERNS: I have Loren Lustig.

CHAIR WOODWARD: Go ahead, Loren.

MR. LOREN W. LUSTIG: I appreciate the data that was presented here. Could you please advise, or perhaps Deke could advise? What would be the number of responses if it was 100 percent of people responded? What is that number?

CHAIR WOODWARD: I believe it would be 45. We have 45 Commissioners. Does it go out to proxies as well, Deke? I guess if that's the case, it could exceed 45, if it goes out to permanent and temporary proxies. I'll let you respond to that, Deke.

MR. TOMPKINS: Thanks, Loren, and thanks, Mr. Chair. Yes, it's supposed to be one response per Commissioner or proxy, so 100 percent response rate would be 45 responses.

CHAIR WOODWARD: All right, any other questions, comments?

MS. KERNS: I see no additional hands.

CHAIR WOODWARD: Thanks again, Deke, we appreciate it.

CONSIDER POLICY ON INFORMATION REQUESTS

CHAIR WOODWARD: At this point I'm going to turn it over to Bob. He's going to talk about the East Coast.

EXECUTIVE DIRECTOR BEAL: I just have a couple of slides on this doc. The document was included in the briefing materials. The bottom line here is, at the end of this the Executive Committee has recommended that this document be approved by the Policy Board as the policy that is going to guide future information requests.

Just as a quick overview, and a little bit of background here. The Commission currently doesn't have a policy on how we handle information requests. People call them FOIA

requests, but I'm avoiding that term, and I'll explain that in a second. The Commission obviously is committed to an open and transparent process.

We've got a lot of detail in our guiding documents on public hearings and public process, and you know we're committed obviously to maintaining and sharing our meeting minutes, and all the other things that we do. However, the Commission is not subject to state and federal FOIA laws, so that's why I don't want to use that term. This is not a FOIA policy at the Commission. Those laws don't apply to us.

We're in a sort of no man's land in the middle of state and federal government, and the laws don't directly apply to us, so how do we handle information requests that we get? We do get them on a somewhat regular basis, and we've been sort of doing it ad hoc over time. We figured, you know it would probably make some sense to really formalize a policy, so that everyone knows what to expect if they make a request at the Commission.

As I said, the majority of the information that people ask for is actually already on our website. Tina, for a lot of them just sends them a link, and says look, here is what you're looking for, you're all set. If you want anything else let us know. You know most of the information requests that we get, we can easily dispense of just by sending them to places on the website, and letting them know what's available if they are unable to find certain things on a website.

The way this policy presents information requests, and the way they'll be handled in the future is that any individual that wanted to get some information that they can't find at a website or just from the Commission. They would send an e-mail to info@asmfc.org and within five days of getting that e-mail, we would acknowledge receipt of the e-mail, and let them know of a reasonable timeline of how we would respond, and what we would respond with.

One of the pieces of that response will likely be that if the request can take more than two hours of staff time, we will charge for staff time, copying, mailing, whatever it may be. You know hopefully we're beyond a time of actually copying hard documents and mailing and that sort of thing. But if people want old documents, there may be some scanning time or something like that.

But the notion of charging for information requests is standard in a lot of FOIA requests, because depending on how they are worded, they can really eat up a lot of time. In that acknowledgement of the request, we would provide an estimate of cost. Based on that estimate of cost, the requester could say, yes go ahead with that information request, I'm comfortable with the cost. They could scale back their request, and we could reissue another estimate, or they could say look, you know what. Actually, based on those costs I'm not that interested, and I don't want that information any more. That will be at the discretion of the requesters, if they pay it or don't pay it.

Then one common theme again in a lot of other policies, is that we will not create new records. What that means is, if a certain way of looking at information at the Commission doesn't exist, we're not going to go and do new analysis, necessarily, for somebody that requests it. If someone chimed in and said Hey, can you go back through the 80,000 comments you got on menhaden, and tell me a state-by-state breakdown of where they all came from, or all the ones that whatever.

You know something whacky like, which ones came from the mountain time zone, or whatever it might be. You know we're not going to necessarily go back and look through each of the records and do a new report, or do analysis for individuals that request it. We would share all the menhaden comments, if anybody wanted them, and they can do their own work on it.

But we wouldn't create a new record or a new report for somebody that requested it. Data limitations, obviously part of this information request is what, you know we try to share as much

as we can. However, there is always limitations on what can be shared and what can't be shared. One of the things that we all deal with all the time is confidential data.

State and federal laws define what is confidential data, and we've been wrestling with this and ACCSP has a policy on this. This is a common theme among requests that you all get at the state and federal level all the time. What our practice has been, and what this policy proposes to formalize, is that anytime we get a data request, we are going to forward that request to the original data collector.

If somebody is interested in whatever, horseshoe crab landings in Georgia, and that data is confidential. We forward that question to Doug Haymans and say, you know we got this request, and this is data that was originally collected by your state, and let the state decide what is available and what is not available.

That is the one way we can assure that we don't violate any of the state or federal data confidentiality rules. Document Limitations, again not all documents can be shared, and not all information can be shared. This Policy spells out that we may restrict access to other information, and certain things like pre-decisional, technical or policy documents will not be shared. That's a practice that we've always employed. It is in our Technical Guidance Document.

If Technical Committees or Stock Assessment Committee, for example, is developing a new stock assessment, and they've got working drafts kind of bouncing between members of that committee, we don't share those, because there have been a number of instances where those sort of interim drafts, non-completed drafts, people have run with them, and the interim information and non-final information shows up in news articles and other things, and it's not the final answer. It is not peer reviewed science. That's how we've handled it in the past, and we'll do that again. Also, documents that won't be shared or attorney-client privileged documents obviously in personal and personnel information. If someone say hey, I would like to have all the home addresses and cell phone numbers of Commission staff. We're not going to provide that to somebody making a request like that. That's all private and personal information.

The document spells out that any questions about what documents can and can't be shared, will be resolved by me, the Executive Director, and consulting with the Commission Attorney. This document strives to be as fair and open as we can be, but there are some things that we're unable to share.

Where we go from here is, you know hopefully as I mentioned, the Executive Committee has reviewed this a few times and updated it, and they're recommending that it be approved by the Policy Board. One of the caveats in the last paragraph in the document is that, you know kind of being open with the public and letting anyone know what to expect, and that if you send a letter or a public comment, or something to ASMFC, it may be subject to this new policy, and maybe share it with people if somebody asks for it.

We have had people in the past that say, "hey can I see any e-mail that went from this industry representative to a staff person, or whatever it is?". You know those documents in the past, if there is nothing confidential in there, we will generally share those letters that bounce back and forth between staff and industry, or NGOs, or whoever it might be.

If this document is approved, what we do is add it to our website so the public knows our policy, and it would be the document that does guide how future information requests are handled. That's a little bit of a lengthy presentation, Spud, but I know the Executive Committee had talked about it quite a bit, but the many members of the full Policy Board hadn't seen it before, so I thought it was worthwhile to go through a little bit of detail on this document, and happy to answer any questions if there are any. Thank you.

CHAIR WOODWARD: Yes, thanks, Bob, and I would agree, I'm glad you took the time to go into the details, because it is important, and it reflects greatly on the Commission's integrity and principals of operation on how we interact with information requests. At this point does anybody have any questions for Bob or comments?

MS. KERNS: I have David Borden followed by Lynn Fegley.

CHAIR WOODWARD: Go ahead, David.

MR. BORDEN: Bob, will the policy stop individuals from accessing their own data, confidential data?

EXECUTIVE DIRECTOR BEAL: No, David. If a state has a policy or the federal government has a policy where individuals can access their own data, you know we would honor that. But we would most likely bounce that request back to the state or the federal agency that originally collected that data. Most likely we would not share that data directly. If somebody from Rhode Island, an individual wanted landings data, or whatever it might be, we would forward them to Rhode Island, and ask Rhode Island to be the gatekeeper on that data.

MR. BORDEN: All right, I would just note, just for your information. I've already been asked that about tracker information by the industry, whether or not they are going to be able to access their own data. The states might want to think about that, because industry, at least some of the members of the industry that I've talked to, would think that would be an advantage to be able to get that type of information on their own boats.

CHAIR WOODWARD: Go ahead, Lynn.

MS. LYNN FEGLEY: I actually had a comment, and I did have two questions, if I may. The first comment was, I am so glad for the element that you're not producing new records or analyses. I think that's super, super important. That's good. My first question is, when you forward a data request to the original collector, so in your example about Georgia. You send the requesters request to Georgia. Who is the state responding to? Are they responding to the Commission, or are they responding to the requester directly?

EXECUTIVE DIRECTOR BEAL: I think it would be good to take the Commission out as sort of the middle person here, and have the state directly responding to the individual, in case there are any questions and back and forth. I can rephrase it and say, we're happy to be in the middle of that discussion and that transaction, but it may be more efficient if the state just goes directly to the individual making the request.

MS. FEGLEY: Yes, that's fine. I was just curious what your thoughts were there. I have no issues with that. Then my second question, if I may, was just a quick curiosity question. How many of these requests are you getting, you know per month or per year? What is the volume like for you guys?

EXECUTIVE DIRECTOR BEAL: It's a good question, and like probably all of you it kind of comes in peaks and valleys, and there are different times where we get some. You know we don't deal with a lot. I don't know, a half a dozen a year maybe, or something like that. We do get a lot of requests just for, as I mentioned, kind of simple things, meeting minutes or audio, you know the recordings of meetings and that sort of thing, and Tina handles those really quickly, because they're all available on the website.

You know there are very few, a half a dozen a year would be a lot of information requests that would bubble up to where we would have to apply this policy, and actually refuse to or filter what we're able to share with the public. Most things we can quickly respond to them and give them what they need, and we could move on pretty quickly. But there are a few every year that we would have to apply this policy and filter out what we can and cannot provide.

CHAIR WOODWARD: Any further questions, comments for Bob?

MS. KERNS: No additional hands.

CHAIR WOODWARD: At this point is there any further interest in querying? **If not, I would entertain a motion from the Policy Board to approve the Request for Public Information Policy as has been presented and discussed.** Would someone like to make that motion and second it?

MS. KERNS: I have Pat Keliher.

MR. KELIHER: So, moved, Mr. Chairman.

CHAIR WOODWARD: We have a motion by Pat Keliher and second by who? I missed that.

MS. KERNS: Mel Bell.

CHAIR WOODWARD: By Mel Bell, all right. Any discussion on the motion?

MS. KERNS: Mr. Chair, I think you said as presented today, so if we could add that to the end.

CHAIR WOODWARD: Yes.

MS. KERNS: I have no hands raised.

CHAIR WOODWARD: Any opposition to the motion?

MS. KERNS: I have no hands raised.

CHAIR WOODWARD: All right, we'll consider the motion approved by unanimous consent. Thanks everyone, and thanks Bob, and everyone for the work on this. Again, it's one of those things we probably won't have to use it a lot, but it's nice to have it when you do need it. Kind of like that fire extinguisher in your kitchen cabinet.

UPDATE ON EAST COAST CLIMATE CHANGE SCENARIO PLANNING

CHAIR WOODWARD: All right, with that we'll move along. Our next agenda item is Update on East Coast Climate Change Scenario Planning, and I'll turn that one over to you, Toni.

MS. KERNS: Thank you, Mr. Chairman. I'm going to try to go through some of this faster than I initially planned, given the timing of the day, but some parts I'm going to stay a little detailed. As you all are aware, the three Councils, the Commission and NOAA Fisheries are jointly working on the East Coast Climate Change Scenario Planning.

As a reminder, scenario planning is a structured process to explore and describe possible futures in a context of uncontrollable and uncertain conditions, where the overall goal is to identify the best ways to adapt and respond to be better prepared for a range of possible future conditions. Today in my presentation I'm going to describe the work undertaken in the scoping phase of the document, as well as provide some information on our next steps in our exploration phase.

This is just a quick reminder of the different phases that we are moving through, and the scoping phase was conducted last summer and the fall. The purpose of this scoping was to introduce and explain the initiative. We received input about the draft project objectives, the focus and expected outcomes of our project, and we also invited ideas from a broad range of stakeholders about the factors and issues. As part of the scoping phase, we did a series of webinars, to introduce the topic, and then we did a follow up online questionnaire. In the online questionnaire we asked participants about the project objectives and outcomes, factors that shaped change, and suggested actions and other advice for conducting the process.

A lot of the questions that we asked were open ended. We received 383 responses from all the different regions and a wide range of stakeholders. We did a coding analysis of the questionnaire responses, to see whether participants thought

adjustments were needed to the project objective, and what factors it would be most important to include in the scenario analysis.

From the scoping process the core team identified five key insights that are further described in the scoping summary report, and that scoping summary report can be found on the scenario planning webpage, which is hosted by the Mid-Atlantic Council. There is a link to that in the meeting overview in your meeting materials.

First, we found that there is a lot of interest in this subject. We had a lot of participants in the webinars and the online questionnaires. The majority of the participants recognized that climate change would affect fisheries in the coming years, and were supportive of efforts to help stakeholders prepare for change.

Second, we heard that stakeholders, particularly on the webinars about how they are already seeing the effects of climate change in many aspects of fisheries and coastal life. There are a lot of interesting examples that will be included in the report, but many of them centered around the observations of changes in species distribution, availability, and productivity.

Third, there was general support for the project objectives, some with comments and suggestions for change. Some minor adjustments to the project objectives were made, based on the feedback, and I'll show those in a couple slides. Fourth, the stakeholders identified a broad range of factors that might shape east coast fisheries over the next 20 years.

We found it interesting that each region and stakeholder group, while certainly having some unique experiences, had very similar overall perspectives about climate change, and how it might shape the future of fisheries. We're going to use this input in our next stage of the initiative. Then finally, in the next stage of the initiative we're going to try to strike a balance between focus and scope, meaning that there is recognition of a wide range of scope of this exercise, and the importance of gathering and engaging wide-ranging input in the process.

However, there is also the recognition that in order to address the central questions of management and governance, it's going to at some point require more focused discussions. This is just to note that that comprehensive scoping document is on the Mid-Atlantic Council's web page. We received a number of comments from the questionnaire regarding the objectives.

In our analysis we coded the responses into the following categories, and there are six categories of comments. About 100 comments suggested changes to the objectives. Some of the examples of changes to the objectives can be seen in Box Number 1. Many commentors supported the existing objectives, with no suggested changes. Box 3, there are examples of commentors who suggested adding additional objectives, and some of those additional objectives are shown in Box 3. Then in Box 4 there are comments related to general considerations for the existing objectives. Then finally, for Categories 5 and 6, there were other comments, and some comments that were disapproving of the objective all together, and there will be more details in that full report, as I said.

This slide just shows how the project objectives were changed, and then we made these suggestions, and then the Northeast Regional Coordinating Council, which is the overarching body of this initiative, approved the changes to the objectives. The first objective added East Cost, and modified the word shifting to changing before stock availability and distribution.

This acknowledges the possibility that stocks might not only shift in location, but also change in terms of availability and distribution. Many felt this was a broader term that would better apply here. For second objective, there were three slight changes. First, the term developed was changed to advanced, to reflect the fact that there are already many tools

and processes in existence, that management and other stakeholders could use in the governance and management of fisheries in the future.

Second, that the requirement that fishery management strategies be robust was added, in addition to flexible. Third, some comments were received about the need to include language regarding conservation and the support of fishing communities. As a result, the objectives were revised to say that fishery management strategies should have the goals of promoting both fishery conservation and resilient communities.

Also from the questionnaire responses, we were able to pull together some categories of responses to the key questions that we asked about, and there are some examples here, not comprehensive, but give you an idea of the type of insight we received. We asked about certainties, what important factors do we know will shape the next 20 years.

Things like ocean temperature, ocean acidification and sea level rise were raised. We also asked about uncertainties, what are the most important but unpredictable factors for the future. Responses included things like stock health and distribution, degree of habitat loss, rate of sea level rise, and impact from fishing communities.

We asked about wildcards, what developments could surprise us and radically reshape fisheries in the next 20 years. Responses included categories like impacts of storms, severe weather, changes in the ocean currents and fishery loss. Finally, we asked about the social, technological, economic, or political factors. Responses here included other ocean uses, loss of working waterfronts, changes in consumer demand, and a degree of stakeholder cooperation.

I noted before, there was not significant regional or stakeholder differences in the responses. The feedback from these questions will feed directly into the next step of the initiative, where we're going to undertake further research on the most frequently mentioned factors. The exploration is our next step, and we are hoping to host, or we will be hosting Driving Forces webinars this coming month, and then right into the beginning of March. The purpose of these drivers of change webinars are threefold, first is to educate. We want to share information about, and discuss the key drivers of change that could shape east coast fisheries over the next 20 years. We want to engage with the stakeholders, and provide an update and opportunity for participants to reengage with the material, and then we want to focus. We want to set the scene for the next phases to ensure participants know the focus is on changing stock availability and distribution, and know that the overall goal is to identify implications for fisheries, governance and management.

This is just a list of the upcoming drivers of change webinars. There are three webinars coming up. The three topics are oceanographic, biological and social and economic. We will have a keynote speaker for each of the topics, and then a panel that will engage with the speaker and ask questions, and then we'll have a short period of time for discussion and engagement with the panel and the keynote speaker.

We're asking participants to familiarize themselves with background materials that we're going to create for each of the topics. Those will be posted to the web page that the Mid-Atlantic Council is hosting. They are two-to-three-page information sheets on each of the three topics. Then we're asking those participants in the webinars, you know what drivers are most important, which drivers are certain, and what driver is uncertain, in order to best engage in the discussion.

These webinars are open to the public. We're sending out invitations to those people that ask to be continued to be kept in the loop that filled out the questionnaire, as well as sending out press releases to all of the different Commission and Council and NOAA lists that we keep on hand for e-

mail. Then just to remind folks, then coming up after explanation we'll still have the creation of the in-person workshops, where we are going to construct and discuss the scenarios.

After that workshop we'll have the application phase. We haven't developed a specific plan for this, but we intend for this to start occurring next summer into the end of the year, and this is where we're going to figure out how to use the scenarios to identify actions and recommendations for the process.

This is where discussions will happen regarding what all of this means, and where we'll produce some of the more concrete outcomes, in addition to the creation of the scenarios themselves. We expect that this phase will likely involve much more participation from the management bodies, as well as some of the expertise about management and government systems, and how they can be improved or modified, in light of the insights gained from this scenario development process. Then lastly, we have the monitoring phase. We planned this for early 2023.

We don't have a lot of details about this yet, but we believe this phase would involve identifying key indicators of change that can be monitored into the future, to help us adapt and respond to future changes. Just as a reminder, this is the web page that the Mid-Atlantic Council hosts for us on this initiative, where all of the information can be found on the work that has been done. It includes the previously recorded scoping webinars, the summary document, the links to the upcoming webinars and additional background information. That is all I have, Mr. Chair.

CHAIR WOODWARD: Thanks, Toni, quite an ambitious undertaking, and I'm sure it consumes a fair amount of your time and that of others, so we certainly appreciate you representing the Commission in this. Are there any questions for Toni on her presentation?

MS. KERNS: I see no hands raised.

CHAIR WOODWARD: All right, I think we must have covered it in the level of detail folks needed. Well, good.

MS. KERNS: Actually, Mr. Chair, Eric Reid has his hand up.

CHAIR WOODWARD: Okay, go ahead, Eric.

MR. ERIC REID: I don't have a question. If people haven't had a chance to look at the presentation Toni just gave, there is going to be a discussion at the New England Council meeting next Wednesday in the afternoon. That's another opportunity to perhaps ask a few questions, so just so you know. Thank you.

MS. KERNS: Thanks, Eric, and I think that Deidre has more time allotted on the agenda, so her presentation might include a little more detail, more specifics on scoping.

COMMITTEE REPORTS

CHAIR WOODWARD: All right, well we'll move on. Our next agenda item is some Committee reports from Dr. Havel, so I'll turn it over to you, Lisa.

ATLANTIC COASTAL FISH HABITAT PARTNERSHIP

DR. LISA HAVEL: I'll start with the Atlantic Coastal Fish Habitat Partnership Update, since this will be very brief. The Steering Committee met virtually December 7-8 of last year, and we worked to revise the current National Fish Habitat Partnership RFP, and also discuss the possible creation of a general ACFHP RFP. This is in response to the infrastructure bill funding that is becoming available.

We wanted to be prepared in case opportunities presented themselves, where we needed to recommend projects with a quick turnaround time. We also started discussing the next conservation strategic plan, and how to handle fund raising into the future. We had a diversity, equity, inclusion and justice discussion, and started working on the diversity statement, as well as came up with

actionable items that ACFHP can take, in order to promote the EIJ.

We voted in again our current Chair and Vice-Chair. Kent Smith is continuing to serve as Chair, from Florida Fish and Wildlife Conservation Commission, and Jessica Coakley from the Mid-Atlantic Fishery Management Council will continue to serve as Vice-Chair. The Steering Committee also reviewed our endorsement project success.

For our endorsed projects we endorsed one since our last update, and it was an on-the-ground living shoreline project in North Carolina. I reviewed the projects that ACFHP endorsed over the past eight years, and for those that were endorsed over one year ago, all but one has been funded. This is a well over 90 percent success rate. I just wanted to remind all the Commissioners that ACFHP is able to endorse projects at any stage, including completed projects, and if you're interested in getting an ACFHP endorsement, I encourage you to visit our website to see the easy application process. Our FY 2023 National Fish Habitat Partnership Project Application were received. The announcement went out on November 16, via multiple communications outlets, and the deadline was last Wednesday, January 19, to submit applications.

We only received three proposals this year, and they were all for the Mid-Atlantic, and the feedback from past applicants that we spoke with so far seems to be the timing. There are a lot of RFPs out right now for on the ground restoration. This one just wasn't as high up on the list as some of the other opportunities right now.

We're hoping that we can fine tune this maybe for the next year, but it seems to be a timing issue so far. As usual, ACFHP would like to thank the Commission for your continued operational support. I'll pause here, in case anyone has any questions, before I move on to the Habitat Committee update, if that's okay.

CHAIR WOODWARD: Any questions for Lisa on ACFHP?

MS. KERNS: No hands.

DR. HAVEL: Excellent.

CHAIR WOODWARD: Very good, all right, go ahead, Lisa.

HABITAT COMMITTEE

DR. HAVEL: Now for the Habitat Committee Report. We have one new member, Mrs. Rachael Peabody from VMRC. The Habitat Committee met virtually on December 2nd of last year. We continue to work on the update to the Acoustic Impacts Habitat Management Series document. We will have this published by the end of this year. We also began working on our state climate change initiative update.

We first released a report in 2016, and then a follow up report in 2018, and a lot has taken place since that 2018 report, so we're working on an update to that. We continue working on a Fish Habitats of Concern. We had a discussion on harbor deepening and offshore wind, and we worked on editing the SAV Policy.

For this SAV Policy update, the Policy Board gave the Habitat Committee approval to develop a living shorelines policy that would be protective of submerged aquatic vegetation or SAV, at the August, 2020 Policy Board meeting. Living shorelines as a reminder, when properly sited are a great alternative to hardened shoreline. They incorporate vegetation or other natural soft elements, they promote shoreline stabilization, wave attenuation, erosion control, and improved fish habitat.

The Habitat Committee supports the use of these softer, more ecologically beneficial means of protecting and stabilizing shorelines. However, some states are placing living shorelines in close proximity to SAV beds, which are directly or indirectly impacting this important habitat for many

Commission-managed species. SAV is essential fish habitat in a HAPC, and the ASMFC updated our SAV policy in 2018, emphasizing its importance. There was discussion at the August 2020 Policy Board meeting among Commissioners, to update the SAV policy that we already have, instead of developing a new policy on living shorelines, and the Habitat Committee decided to take this route when addressing living shoreline impacts to SAV. We sent a draft of this updated policy to state directors on December 13, and then we incorporated those edits and suggestions into a new version, which was included in the briefing materials for this meeting.

The major edits to that 2018 SAV policy, we updated the language in Policy 2, which is protection of existing SAV and associated habitat, to clarify the Commission's position on the installation of living shorelines and nature-based features over hardened shoreline, when possible, but stated that SAV habitat and buffers should be a critical constraint that influences living shoreline or nature-based future selection and design. That was the major edit to this SAV Policy update.

We also made a couple of other more minor edits. We refined the definition of SAV and SAV Habitat. The final language here clarifies the past definition, and includes current or historic presence of SAV. Under Policy 3, restoration of SAV, the Policy was expanded to include confirmation that existing conditions can support restoration, in addition to reestablishing degraded conditions necessary to support SAV.

That was a minor adjustment, but I wanted to highlight it here. We also had some changes in the introduction and throughout including with the new Chesapeake Bay SAV restoration goal, so that has since been updated since 2018. The status of Johnson seagrass in Florida and coastal construction and algal blooms as major threats.

Then there were just minor changes throughout the clarification and readability that did not change the content or the intent of the policy. With these updates we're hoping to have the edits approved today. With that I am happy to take any questions or would welcome a motion to approve it. Thank you.

CHAIR WOODWARD: Thanks, Lisa, I appreciate you guiding the Committee on this. It's important to keep these partnerships alive and relevant, and I think these modifications have certainly done so. At this point any questions for Lisa or comments?

MS. KERNS: Pat Keliher.

CHAIR WOODWARD: Go ahead.

MR. KELIHER: This is a little bit nitpicky, because I realize this document has been called the SAV Policy for a long, long time. I support all of the edits. I think the Habitat Committee has done a great job recognizing the importance of this particular type of work. But since the Commission doesn't really have any authority here.

The authority lies in different areas within the states. To me this is more of a best management practices document than a policy. I'm not suggesting we change the name now, just reflecting the fact that policy really doesn't seem to fit in this particular case. **But with those statements in mind, I would make a motion to approve the updated SAV Policy.**

CHAIR WOODWARD: All right, thank you, Pat, do I have a second to the motion?

MS. KERNS: Joe Cimino.

CHAIR WOODWARD: Second by Joe Cimino. I hear what you're saying, Pat. If you look up the definition of policy in the various dictionaries, it's kind of all over the place too, it sort of depends on the context for how you use it. I think everybody understands what you mean by that. There is policy and then there are guidelines, and a variety of other descriptors for things that we use to help plot our

course along a pathway. Any discussion on the motion?

MS. KERNS: I see no hands.

CHAIR WOODWARD: Any opposition to the motion?

MS. KERNS: No hands in opposition.

CHAIR WOODWARD: All right, we'll consider the motion approved unanimously. Thank you, Lisa, very much and thank the Habitat Committee for their work on our behalf. We appreciate it.

PUBLIC COMMENT

CHAIR WOODWARD: In my zeal to move into the agenda, I overlooked the public comment part of our agenda, so at this point I would like to open up. Is there anyone from the public who would like to make a comment?

MS. KERNS: I see no hands, and I'm just going to remind folks that red is raised, so when the arrow is red that means your hand is up, just in case people are unfamiliar. I still have no hands.

CHAIR WOODWARD: All right, so no public comment. We have no noncompliance findings to deliberate over.

OTHER BUSINESS

CHAIR WOODWARD: Is there any other business to come before the Policy Board?

MS. KERNS: I have Joe Cimino.

CHAIR WOODWARD: Go ahead, Joe.

MR. JOE CIMINO: Thanks, Mr. Chair, and I'll be brief, because I've already heaped my praises on Kirby and Savannah, even in her very brief time. But I couldn't let it pass without giving a big shout out to Mike Millard. I met him at the turn of the century, I won't say which one. I met him as a young grad out of college, had a chance to work on the Hudson River with him doing catch and release mortality for striped bass and shad, and it was just about the best introduction a college grad could get to fisheries. I just want to say thanks and best wishes to him.

ADJOURNMENT

CHAIR WOODWARD: Thank you, Joe. I appreciate that. All right, if there is no other business to come before the Policy Board, we will stand adjourned.

(Whereupon the meeting adjourned at 2:16 p.m. on January 27, 2022.)

SEA TURTLE BYCATCH IN TRAWL FISHERIES

SUMMARY OF ISSUES
MAY 2022

BACKGROUND: As we presented at the January Commission meeting, fisheries bycatch is a primary threat to sea turtles in our region, and the highest trawl bycatch occurs in the Atlantic croaker, longfin squid, and summer flounder fisheries. We have tested gear (e.g., Turtle Excluder Devices (TEDs)) and operational (e.g., data loggers to monitor tow durations) modifications in these three fisheries. While there is still research to be completed, the results indicate that these modifications can be effective at reducing the severity of interactions with sea turtles and are operationally feasible.

UPDATES SINCE JANUARY PRESENTATION: Decomposed sea turtles were removed from the numbers presented at the January Commission meeting. As a result, the total number of observed sea turtle interactions in trawl gear from 2000 to 2019 was 264, with 95 occurring on croaker trips (identified by the top landed species by hail weight), 50 on longfin squid trips and 45 on summer flounder trips.

POTENTIAL MITIGATION: While final operational feasibility research is completed, NMFS is gathering early input and information from the public, fishing industry, and other stakeholder groups to inform any future measures. Given the results of previous research, we are considering:

1) Requiring TEDs with a large escape opening in trawls that target Atlantic croaker, weakfish, and longfin squid to reduce injury and mortality resulting from accidental capture in these fisheries;
2) Moving the current northern boundary of the TED requirements in the summer flounder fishery (i.e., the Summer Flounder Fishery-Sea Turtle Protection Area) to a point farther north to more comprehensively address capture in this fishery;
3) Amending the TED requirements for the summer flounder fishery to require a larger escape opening to allow the release of larger hard-shelled and leatherback sea turtles; and
4) Adding an option requiring limited tow durations, if feasible and enforceable, in lieu of TEDs in these fisheries to provide flexibility to the fisheries.

SUMMARY OF INFORMATION RECEIVED: Council/Commission meetings, public webinars, call in days, and additional public responses resulted in approximately 30 questions and 30 comments. Feedback consisted of questions on the sea turtle bycatch estimates, observer data, and research. Comments were received on the geographical range of the measures, tow duration issues, fishery definitions, and economic impacts. Several information needs were also identified related to additional data and research.

ADDITIONAL INFORMATION: Background information (including the latest trawl bycatch estimate), descriptions of TED designs, research results, type of information needed, recordings of the public webinars, and how to comment can be found at our website.

Summer Flounder, Scup, and Black Sea Bass & Mackerel, Squid, and Butterfish Advisory Panel Meeting Summary

Tuesday, February 15, 2022, 2:30 pm - 4:00 pm

Advisory Panel Members in Attendance: George Topping, Bonnie Brady, Eleanor Bochenek, Harvey Yenkinson, Kenny Hejducek, Greg DiDomenico, Katie Almeida, Meghan Lapp, Pam Lyons Gromen, Mike Waine, Gerry O'Neill, Jeff Kaelin, Bob Pride, Joseph DeVito, Mike Plaia, Daniel Farnham, Jr., Emerson Hasbrouck, Jeff Deem.

Other Attendees: Carrie Upite (NMFS Staff), Jeff Gearhart (NMFS Staff), Karson Coutre (Council Staff), Kiley Dancy (Council Staff), Peter Hughes (Council), Adam Nowalsky (Council), Sonny Gwin (Council), Chris Batsavage (Council), Carly Bari (NMFS Staff), Colleen Coogan (NMFS Staff), Henry Milliken (NMFS Staff), Emily Keiley (NMFS Staff), Jason Didden (Council Staff), Wes Townsend (Council), Dan Farnham (Council), Alissa Wilson, Nick, JB, JN.

Summary:

The Advisory Panels met via webinar and reviewed a presentation from Carrie Upite (NMFS Protected Resources Division) on sea turtle trawl bycatch issues and the ongoing research on mitigation measures in the Greater Atlantic Region. Advisors provided the following questions and comments; however, these do not represent consensus statements.

Several advisors asked clarifying questions regarding the sea turtle bycatch estimate including how the estimate was derived and how the estimate compares to the observed sea turtle interactions. NMFS staff described the estimation process and responded that they would share the bycatch estimate paper which describes the methodology and data in more detail.

Multiple advisors were interested in more information about how many turtles were released alive versus dead and details of the calculated mortality rate estimate. Advisors felt this information is important when determining the scale of the issue. An advisor added that the bycatch estimate of 571 interactions across all trawl fisheries is lower than the number of turtles that are found cold stunned each year and felt it was misleading to say that trawl fisheries are the largest threat to sea turtles. Because of this, they added that it is unfair to impose draconian measures on the trawl fleet.

Advisors also asked how fisheries were defined and commented that hail weight by species was not always the best way to define a fishery. One advisor asked whether different trawl net types were analyzed and if there were different turtle bycatch estimates depending on the net. NMFS

staff responded that different net types within the bottom otter trawl category were not analyzed separately but this was something that could be explored further. Another advisor requested more specific regional information and the percent of trips where sea turtle takes have been observed, noting that in the past there had been an estimate of 5 takes for an area with no observed takes. NMFS staff noted that they would send this advisor the paper that provides regional information.

An advisor asked whether interactions with sea turtles were different during the day versus at night. This advisor also asked about sea turtle behavior when in front of the trawl net and whether sea turtles get herded in or try to escape. NMFS staff indicated day versus night interactions had not been looked at yet. Staff also noted that sea turtle behavior can differ based on the size of the net, for example with larger nets turtles are already in the back of the net when they realize it and therefore cannot escape. Furthermore, in lower visibility turtles will not react as quickly.

One advisor requested that more information be provided to the public about the health and regional status of the different sea turtle populations and how the TEDs have worked in fisheries where they have been required. They asked if there are success stories that can inform current decision making. This advisor also suggested that flexible TEDs may be the preferred modification out of the different TED options. They noted that they were not aware that there was a current croaker fishery, however linking summer flounder and squid for this analysis would make sense because often the same boats fish for both species. They added that getting the word out to commercial fishermen needed to be prioritized and felt that this issue was coming as a surprise after not being discussed for several years. Another advisor noted that comments to NMFS regarding sea turtle bycatch issues were sent in 2009 on behalf of the Garden State Seafood Association and they never received a response. While rulemaking never occurred at that time for a variety of reasons, it was discussed that this letter was sent to Council staff recently and would be sent to NMFS staff for their review since many of the comments are still relevant.

One advisor voiced concern over interactions with sea turtles in recreational fisheries due to vessel strikes or fishing hook and line injuries and asked whether these were monitored and mitigated. They noted that the large number of sport boats moving at high speeds in the summer may be a source of sea turtle interactions that needs to be documented. NMFS Staff responded that there are different reporting mechanisms for when these interactions occur; for example, stranding networks record information about the condition of turtles when they wash up on beaches. Watercraft injuries are a major concern and there are efforts underway to minimize those injuries and interactions.

An advisor asked whether cameras could be used on the gear so that if an operator sees a turtle go in the net they can tow for a shorter amount of time. NMFS staff responded that this had been looked at in the past. There were some water clarity issues and it is a high-cost monitoring system to obtain a live feed of the net camera. Another advisor commented that in the squid fishery there is no option to compensate for reductions in catch by targeting another species on the same trip using squid mesh, therefore reductions would be a direct economic loss.

Overall, several advisors agreed that in order to have meaningful solutions, more information needs to be provided to the public such as the number of strandings, other sources of mortality such as vessel strikes, observed takes by region, and population assessments for the sea turtle species of concern. Another advisor reiterated that the trawl data needs to be analyzed at a finer scale to determine if there are gear configurations or net types where turtle interactions are not occurring.

MID-ATLANTIC
FISHERY MANAGEMENT COUNCIL

Research Set-Aside (RSA) Workshop Meeting 4 – Summary Recommendations

Wednesday, February 16, 2022

Compiled by

Brandon Muffley and Andrew Loftus

SUMMARY OUTCOMES

Research Set-Aside Workshop
Workshop 4 (Summary Recommendations)
Wednesday, February 16, 2022

Contents

SUMMARY OUTCOMES

Research Set-Aside Workshop
Workshop Meeting 4 (Summary Recommendations)

Workshop Goal: The goal of Workshop Meeting 4 is to review the recommendations from the first three workshops and provide input for consideration by the Council's Research Steering Committee (RSC) regarding recommendations for RSA program redevelopment.

Next steps after this workshop

Dr. Michelle Duval (RSC Chair)
(Full presentation is included in Appendix II)

- April 27th – RSC meeting to review all input and develop guidance and final recommendations for Council consideration.
- June 7–9 – Council meeting to review RSC recommendations and make a decision on whether to redevelop the RSA program.
- Depending on decision from Council:
    - If the decision is "no," there will be no further (immediate) work on redevelopment.
    - If the decision is "yes," begin to develop appropriate management action document (i.e., framework or amendment).
    - Depending upon action and included components, it would likely be 1+ years to complete.
    - Will need to coordinate/work with the Atlantic States Marine Fisheries Commission and state agency staff/enforcement on program details and specifics.

Role of the Scientific and Statistical Committee (SSC) Economic Work Group

Dr. Geret DePiper (Chair, SSC Economic Work Group)

(NOTE: Full presentation is included in Appendix III and key points of the question & answer dialogue are captured in the appropriate summary section of the discussions below.

Key Points

- Economic Work Group was established by the Council specifically to provide input into the economic impact of issues before the Council.
- Collaborative and iterative process with the Council structure.
- RSA program inherently has a number of economic implications.
- A series of white papers has been developed for each of the previous RSA Workshops (Workshops 1-3).
- Supporting material for today's workshop focus on how the program design impacts the ability to achieve RSA goals:
    - Who participates.
    - How quota is allocated.
    - What RSA trips look like.

Workshop 1-3 Recap/brief overview of issues from the previous program

Presentation by Andrew Loftus (workshop facilitator)
(NOTE: Full presentation is included in Appendix IV)

Key Points

- **Workshop 1 (Research)**
  - Identify how research goals will be prioritized, projects will be screened, and results will inform management/be communicated to the Council and stakeholders.
- **Workshop 2 (Funding)**
  - Discuss how the program will be administered (federal grant program), discuss funding mechanism, and indicate that projects should be tied to management/assessment needs.
- **Workshop 3 (Enforcement)**
  - Identify potential program modifications that could prevent reoccurrence of previous enforcement issues.
- **Workshop 4 (Recommendations)**
  - Review the recommendations from the first three meetings (synthesized by the RSC) and provide input for RSC consideration regarding recommendations for RSA program redevelopment.

Workshop Goal Discussions

Draft Goals of RSA Program

Brandon Muffley (MAFMC staff)
(NOTE: Full presentation is included in Appendix V).

Summary

- Based on feedback and input from workshop #1 - #3, identified a list of nearly 20 different potential objectives.
  - RSC took that list and created four draft goals and associated objectives.
- Developed a decision tree to identify different RSA program components and consider how they may support the goals and objectives identified.
- Prioritized and refined the draft Goals and Objectives
  - Identified linkages across goals and implications for working through decision tree.
  - Consider trade-offs associated with different decision tree options in achieving specified goals.
- Goals and Objectives provide the overall framework for a possibly revised program; while alternatives/questions in the decision tree specify the structure and details of program in support of goals.

Listed in Priority Order. Blue capitalized lettering indicates language added during the discussion.

Goal 1. Produce quality, APPROPRIATELY peer-reviewed research that maximizes benefits to the Council, MANAGEMENT PARTNERS, AND THE public and enhances the Council's understanding of its managed resources (Research)

1. Support more applied management-focused research activities.
2. Higher priority on proposed RSA projects whose results would likely have immediate application to species management.
3. Discourage commitments to longer-term monitoring projects.
4. Ensure all data collected (funding and research) through the RSA program is open access.

Goal 1 Discussion

- It is implied that states are included in the RSA program. For jointly managed species, should add language "management partners."
- Does all research need to be peer reviewed?
    - Should be scientifically valid but not necessarily a full independent peer review process.
    - The intent of "peer review" is to set a high bar, not necessarily an outside peer review such as for publication.
    - There is a peer review by NOAA as part of the RSA process.
    - Conclusion: Peer reviewed does not mean published.
- "Open access" for data is a lofty goal but may be difficult to implement.
    - "Confidential data" may not be able to be open access.
    - All objectives are subject to laws etc. so this would apply to open access and confidential data.
- For objective #2, suggestion to replace the word "immediate" with "timely" noting that research does take time and as does the QA/QC and peer review and key is having the information available when its needed.

Goal 2: Ensure effective monitoring, accountability, and enforcement of RSA quota (Enforcement and Administration)

Original Order	Revised Order	Goal #2 Objective
1	4	Minimize law and admin (agency and researcher) burdens.
2	6	Improve STATES' ability to revoke RSA fishing privileges.
3	5	Provide support for admin and law activities.
4	1	Apply enhanced, adaptive, and consistent enforcement standards and controls.
5	3	Increase state-federal science, enforcement, and administration collaboration and cooperation.
6	2	Ensure compliance with the reporting and use of the RSA quota.

Goal 2 Discussion

- Move #4 ("Apply…) and #5 "Ensure…." Should be moved up if this is prioritized.
- "Improve ability to revoke RSA fishing privileges" is not needed for the Federal level but is really applicable to the state level enforcement (perhaps add "state" into bullet 2).
- Suggested order for prioritization is 4, 6, 5, 1, 3, 2, agreed upon with no objection.

Goal 3: Generate resources to fund research projects that align with the priorities of the Council (Funding)

1. Maximize revenues from RSA quota.
2. Provide equitable opportunity to fund research across all Council-managed species.
3. Increase scientific and industry partnerships.
4. Evaluate fairness in fishing community access to RSA quota.

Goal 3 Discussion

- Does #2 mean using money from a species of value to support research on other species? Response: Yes, including this objective would indicate a willingness to use funds generated from one species to support research for another species. By including this objective, this would also answer, by default, questions raised in the decision tree document (see Topic 2, Questions 2A and 2B)
- "Maximizing revenues" depends on how it is defined. "Maximize" doesn't necessarily mean getting the highest gross return, but a high net return; minimizing administrative and law enforcement costs might maximize the net revenue of a program.

Goal 4: Foster collaboration and trust between scientific and fishing communities and the general public

1. Ensure all data collected (funding and research) through the RSA program is open access.[Move to #2]
2. Ensure an open, accountable, and transparent process through all steps (funding and research) of the RSA program. [Move to #1]
3. Increase scientific and industry partnerships.
4. Evaluate fairness in fishing community access to RSA quota.

Goal 4 Discussion

- A suggestion was made to combine Goal 1 and 4. However, others thought that they should remain separate, particularly to keep an emphasis on fostering fair collaboration with the fishing community. The point was made that quota taken away from fishermen for RSA should be used to provide science that benefits everyone, not just improve relationships with those participating in the RSA program.
- Objective #2 should be moved to the top.
- Need to be cautious about the expectations set by some of these objectives; certain aspects are confidential by law and cannot be "open."

Public questions/comments on Goals

- Input was offered that Goal 4 should be prioritized as the first one; trust should be the foundation, and participation of the fishing community is necessary for the RSA program. Following discussion, the Panel consensus was to leave the Goals prioritized as is.

Specific Topic Discussions

- Red/Orange text indicates the options recommended by the RSC.
- Green lettering is text added following the January RSC meeting.
- Blue lettering indicates language added during the discussion during this meeting.

Topic #1 - Who is involved in the RSA program?

Dr. Mark Holliday (SSC Economic Work Group)
(NOTE: Full presentation is included in Appendix VI)

Topic 1Summary

- Accept that trade-offs are a natural consequence of decision making.
- Clearly document rationale for decisions.

Topic #1 - Who is involved in the RSA program
Top Tier/Highest Priority Questions
1A. Allow commercial sector participation only
1B. Allow commercial and for-hire sector participation (no private recreational fishermen)
1Bi. Phase-in participation by one sector
1C. Allocation of quota across sectors or keep separate
2A. Fixed percentage of ABC for each fishery (i.e., different percentages for each fishery)
2B. Fixed percentage of ABC across all fisheries
2C. Fixed number of pounds for each fishery
3A. Allow participation only by federally-permitted vessels
3B. Allow participation by federally-permitted and state-permitted vessels
3Bi. Phase-in participation by permitted (state) vessels
3Bii. Appropriate/standardized reporting for all vessels
3C. Do not allow participation by vessel owners that are also dealers unless dealer has a physical address for place of business
4. Allow states to opt out of shoreside participation in an RSA program (e.g., providing required state exemption permits, etc.)
5A. Cap the number of vessels that can participate within each state
5Ai. Cap by sector (depending on alternatives 1A-1C)
6A. ~~Require~~ Allow observers/state staff onboard all RSA compensation fishing trips
6B. ~~Require~~ Allow all vessels to be equipped with VMS or AIS

Topic 1Discussion Summary

Option Set 1 (1A-1C)

- General support for keeping the RSA program open to both Commercial and For-Hire fishermen. Both sectors are important for generating specific science and if there is discontent from sectors that are excluded it is likely to erode long-term support for the program.
- Some comments that allocation of the RSA quota should be determined by the Council and that setting a standard for separate allocations as part of the RSA plan would complicate implementation and monitoring.
- Details will need to be fleshed out further by the RSC.

Option Set 2 (2A-2C)

- From an implementation standpoint, dealing with "fixed poundage" rather than a percentage is much easier.
- Requiring a percentage of ABC from each fishery may be problematic in the long-term. The value of a specific fish changes over time and species that don't generate sufficient revenue would not result in bids for harvest.
- The Council would have the option to not allocate RSA quota for species with little value.

Option Set 3 (3A-3C)

- Both federal and state-permitted vessels should be subject to the same reporting requirements.
- Support for sub-options associated with 3B (those in green).

Option Set 4

- There is a legal gray area for a state to opt out of allowing federally-permitted vessels to participate in federally-approved activities.
- "Opt in" might be a better option than opt out. Providing states flexibility to limit the sectors that can participate may help alleviate administrative burden and encourage states to opt in.
- Federal regulations and permits are helpful for enforcement; some states do not have the capability to enforce some issues with the existing state-issued permit infrastructure.

Option Set 5 (5A-5Ai)

- No recommendation; this should be a state decision.
- Current limitation of 50 federally-permitted vessels per RSA supported project.

Option Set 6 (6A-6B)

- Changing "require" to "allow" would make these requirements a moot point.
- Law enforcement needs to weigh in on this.
- Some discussion that "allow" applied to observers but that "require" pertained to VMS or AIS. These are two very different electronic systems and further discussion needs to occur.
- Overall support for some type of electronic monitoring and the RSC needs to consider/ discuss this further.

Topic #2: How would you allocate/divide the RSA quota?

Dr. Geret DePiper (SSC Economic Work Group)
(NOTE: Full presentation is included in Appendix VII)

Topic 2 Summary

Topic #2 - How would you allocate/divide RSA quota
Top Tier/Highest Priority Questions
1A. RSA applies to all fisheries/species 1B. RSA only for select fisheries/species
2A. Allow specific percentage of projected revenue from species quota sale to be used for research on other species 2B. All revenue from species quota sale can only be used for research related to that species
3A. Funding mechanism should include ability to use both bilateral agreements and third party auctions 3B. Funding mechanism should include the use of only bilateral agreements or third party auctions (only one) 3A-Bi. Conduct periodic review of funding mechanism(s) to determine approach supports or undermines project or program objectives
Secondary Tier Priority Questions
4A. Single species quota lots only 4Ai. Allow specific percentage of revenue from species quota sale to be used for other species research 4Aii. All revenue from species quota sale can only be used for that species 4B. Bundled and single species quota lots
5A. Support short-term projects only (2-3 years max) 5B. Support short- and long-term projects (i.e., monitoring)
6A. Proposals need to identify scientific need and how results will reduce uncertainty 6B. Proposals need to identify how results will address a timely/relevant management issue 6C. Proposals need to include a detailed data sharing/management plan

Topic 2 Discussion Summary

Option Set 1 (1A-1B)

- Agreed that the language for these options should be revised to clarify that it refers to FMPs and species and not fishing sectors (e.g., private recreational fisherman are not a component of the RSA program).
- The Council would have the option to allocate or not any specific species.

Option Set 2 (2A-2B)

- Consensus that funds generated by RSA could be used to support research for any managed species (MAFMC and any other management entity, e.g., ASMFC or NEFMC). This requires additional discussion by the RSC.

Option Set 3

- The Council doesn't have the ability to tell a PI how to monetize a quota but Council could offer guidance or recommendations. This option allows for both bilateral and third party (i.e., auction) agreements.
- 3A and 3Ai —if/when conducting future reviews of the RSA funding mechanism(s), need to include mortality as part of this review to ensure we are minimizing/not

increasing mortality associated with harvest of RSA quota and mortality associated with RSA related research.

Topic #3 - What does an RSA trip look like?

Dr. Lee Anderson (SSC Economic Work Group)
(NOTE: Full presentation is included in Appendix VIII)

Topic 3 Summary

Topic #3 - What does an RSA trip look like
Top Tier/Highest Priority Questions
1A. Compensation harvest completely decoupled from funded research (i.e. vessels harvesting RSA quota are not vessels conducting research) 1B. Compensation harvest decoupled from research activity, but vessels harvesting RSA quota also participate in research trips 1C. Where feasible, compensation harvest is coupled with research activity
2A. Require RSA harvest OF A SPECIFIC SPECIES to occur on separate trips from non-RSA harvest OF THAT SAME SPECIES 2B. Allow both RSA and non-RSA harvest on the same trip
3A. Limit RSA offloads to specific ports in each state 3Ai. Limit RSA sales to specific dealers in each state 3Ai(1). Limit RSA sales to only federally permitted dealers 3B. Require all RSA quota to be offloaded at the same port from pre-trip notification
4. Limit RSA offloads to specific hours (e.g., 6am-8pm)
5A. Require all participating vessels to submit a pre-trip notification 24hrs in advance to declare intent to harvest RSA quota that includes port and anticipated day/time of landing. 5B. Require all vessels to report port of landing, amount of RSA quota onboard, and complete an electronic trip report at least six hours prior to landing
6A. Allow RSA trips to land quota after the regular season closes 6B. Allow RSA trips to increase trip limits during the regular season 6C. Allow RSA trips flexibility in both the timing and landings throughout the year
Secondary Tier of Priority Questions
7A. Unlimited transfer/leasing of RSA quota between vessels 7B. Do not allow transfer/leasing of RSA quota except under catastrophic circumstances. 7C. Allow for one or limited number of transfers/leases of RSA quota between vessels

Topic 3 Discussion Summary

Option Set 1 (1A-1C)

- It is very rare where harvesting activities are integrated into the research activities (option 1C) but the group supports for keeping this option since there is concern for increasing mortality by allowing harvest under the RSA program and the mortality associated with the research.

Option Set 2 (2A-2B)

- Having dedicated trips will likely improve enforceability and administration of the program.
- However, this may increase discards and complicate trips for fishermen.
- "Landing flexibility" allows vessels to possess another state's quota in other states along the coast and was not in place when the previous RSA program was in place which may complicate this option.
- Summary: RSA trips/harvest and non-RSA trips/harvest *for the same species* could not occur on the same trip but harvesting of other species where RSA quota is not used would be allowed. All harvest of a species under a declared RSA trip (e.g., summer flounder) would count against the RSA quota, regardless if under/over the state designated trip limit.
- RSC needs to discuss how to address remnant RSA quota that is not sufficient to justify a separate trip.

Option Set 3 (3A-3B)

- This requirement is feasible and the intent of the program currently.

Option Set 4

- No discussion (RSC indicated this is a state issue and they should identify offload timing requirements based on fishery needs and enforcement capabilities)

Option Set 5 (5A-5B)

- No objection but some thought that both 5A and 5B should both be required for an enforceable program. However, there was considerable concern about requiring an electronic trip report 6 hours before landing since some trips in the Mid-Atlantic are not even 6 hours long.
- eVTRs require reporting (completion of the VTR) before they enter port. Any pre-landing reporting will aid enforcement.
- RSC needs to discuss the 6 hour pre-landing reporting requirement (5B).

Option Set 6 (6A-6C)

- This must be interpreted in the context of all of the other requirements specified earlier.
- This allows flexibility (e.g., after season closure and higher trip limits).

Option Set 7 (7A-7C)

- Not discussed (second tier questions)

Public questions/comment

- Topic 3, Option 2A – maybe one compromise is to specify by species; require harvest of RSA
- What happens if a vessel has a small amount of RSA quota left over? This needs to be addressed.

Wrapping it all up: Summary of Consensus Decisions

Andrew Loftus (workshop facilitator)

- The RSC needs to assemble a summary table comparing elements of the former RSA program to that proposed through this workshop process, particularly addressing the issues that were identified when the old program was discontinued.
- Goals 1-4 were agreed to with the current priority order. Some reordering of objectives under specific goals and some word tweaking were recommended but not major changes.

Topic Areas

- Recommendations made by the RSC were generally agreed to with some clarification and tweaking.
- More discussion is needed on monitoring – electronic and state-observer and the different components of VMS and AIS.
- Possibly provide a state opt-in option (rather than opt out) regarding participation in the RSA program.
- Need to consider a state's ability (or lack of) for regulating a state-permitted vessel participating in a federally approved RSA program; some states lack the authority.
- Include a recommendation "Where feasible, compensation harvest is coupled with research activity."
- Need further refinement of Topic 3, 2A. "Require RSA harvest to occur on separate trips from non-RSA harvest" and the nuances to this in consideration of the impacts on increasing discard of fish. Make sure that it refers to specific RSA species quota.
- General agreement on the need for tight pre-trip notification of an RSA trip (and species) as well as pre-landing notification, although the 6 hour requirement may need to be nuanced.
- At a future meeting, the RSC will be considering all of these discussions and some second tier questions that were not addressed in this workshop before making a recommendation to the Council.

Atlantic States Marine Fisheries Commission

DRAFT ADDENDUM XXXIV TO THE SUMMER FLOUNDER, SCUP, AND BLACK SEA BASS FISHERY MANAGEMENT PLAN AND ADDENDUM II TO THE BLUEFISH FISHERY MANAGEMENT PLAN FOR PUBLIC COMMENT

Harvest Control Rule for Recreational Management

This action is being developed with the Mid-Atlantic Fishery Management Council.

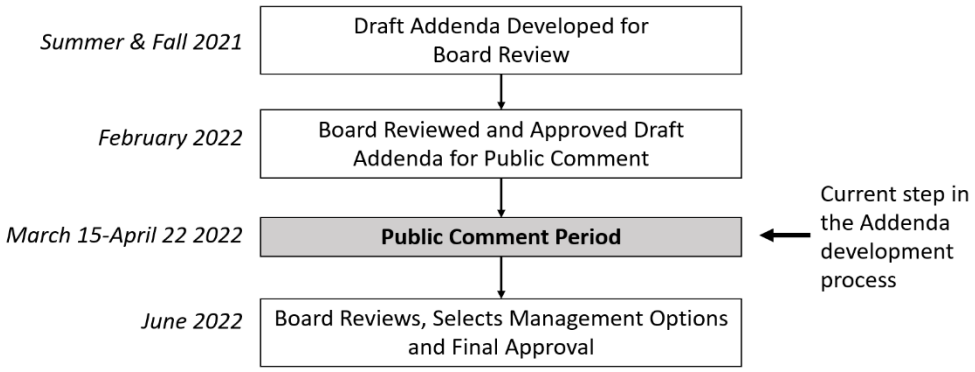
Approved for Public Comment February 2022
Updated March 2022 (Appendix 3)

Sustainable and Cooperative Management of Atlantic Coastal Fisheries

Draft Document for Public Comment

Public Comment Process and Proposed Timeline

In October 2020, the Atlantic States Marine Fisheries Commission's (Commission) Interstate Fisheries Management Policy Board (Policy Board) and the Mid-Atlantic Fishery Management Council (Council) initiated draft addenda (for the Commission) and framework action (for the Council) to address management of the summer flounder, scup, black sea bass, and bluefish recreational fisheries. This document (Draft Addendum XXXIV to the Summer Flounder, Scup and Black Sea Bass FMP and Draft Addendum II to the Bluefish FMP, herein referred to as Draft Addenda) and the Council's framework consider modifications to the process for setting recreational bag, size, and season limits (i.e., "recreational measures") for all four species. The Draft Addenda and the Council's framework action consider an identical set of options and the Commission's Interstate Fisheries Management Policy Board (Policy Board) and Council will select the same management options for implementation. This document presents background on recreational management for these species and a range of options to set recreational measures for public consideration and comment. The addenda process and expected timeline are below.



Public comment may be submitted via public hearings or through written comment and will be accepted until April 22 at 11:59 p.m. If you have any questions or would like to submit a comment, please use the contact information below. **All comments will be made available to both the Commission and Council for consideration; duplicate comments do not need to be submitted to both bodies.**

Tips for Providing Public Comment

We value your input. To be most effective, please include specific details as to why you support or oppose a particular proposed management option. Specifically, please address the following:

- Which proposed options do you support, and which options do you oppose?
- Why do you support or oppose the option(s)?
- Is there any additional information you think should be considered?

For the options in Section 3.1, we encourage you to think about the following questions:

- In your opinion, which option represents the best process for setting recreational management measures and why?
- What types of information are most important in guiding the selection of management measures (e.g., stock size, recent harvest levels, whether or not overfishing is occurring)?
- What circumstances should trigger changes in management measures (e.g., a change in stock size, an expected harvest limit overage or underage)?

Draft Document for Public Comment

Submit Comments to:

Mail: Dustin Colson Leaning, FMP Coordinator
Atlantic States Marine Fisheries Commission
1050 North Highland Street, Suite 200 A-N
Arlington, VA 22201

Email: comments@asmfc.org
(Subject: Harvest Control Rule)
FAX: 703.842.0741

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1.0 Introduction

Summer flounder, scup, black sea bass, and bluefish fisheries are managed cooperatively by the Commission in state waters (0-3 miles) and by the Council and NOAA Fisheries in federal waters (3-200 miles). The management unit for summer flounder in U.S. waters is the western Atlantic Ocean from the southern border of North Carolina northward to the U.S.-Canadian border. The management unit for scup and black sea bass in U.S. waters is the western Atlantic Ocean from Cape Hatteras, North Carolina north to the Canadian border. Bluefish are managed in U.S. waters along the entire eastern seaboard, from Maine to Florida.

The Council and Commission jointly agree to recreational annual catch limits (ACLs) and recreational harvest limits (RHLs) for all four species, which apply throughout the management units. They also jointly agree to the overall approach to setting recreational bag, size, and season limits (i.e., recreational measures). Recreational measures in state waters are determined through the Commission process as outlined in Addendum XXXII for summer flounder and black sea bass, Addendum XI for scup, and Amendment 1 for bluefish.

In October 2020, the Commission's Policy Board and the Mid-Atlantic Fishery Management Council approved the following motion:

> *Move to initiate a joint framework/addendum to address the following topics for summer flounder, scup, black sea bass, and bluefish, as discussed today:*
>
> - *Better incorporate MRIP uncertainty into management*
> - *Develop guidelines for maintaining status quo measures*
> - *Develop a process for setting multi-year measures*
> - *Consider changes to the timing of federal waters measures recommendations*
> - *Harvest control rule*
>
> *and to also initiate an amendment to address recreational sector separation and recreational catch accounting such that scoping for the amendment would be conducted during the development of the framework/addendum.*

During their February 2021 meeting, the Council and Policy Board prioritized development of the harvest control rule referenced in the motion above prior to further development of the other topics. This Draft Addenda and the complementary Council framework address only the harvest control rule; however, as described in more detail in later sections of this document, considerations related to uncertainty in the Marine Recreational Information Program (MRIP) data, guidelines for status quo measures, and multi-year measures are incorporated into many of the options.

The goal of the Draft Addenda and the Council's framework is to establish a process for setting recreational bag, size, and season limits for summer flounder, scup, black sea bass, and bluefish such that measures aim to prevent overfishing, are reflective of stock status, appropriately account for uncertainty in the recreational data, take into consideration angler preferences, and provide an appropriate level of stability and predictability in changes from year to year.

2.0 Overview

2.1 Statement of Problem

As described in more detail in section 2.2, the Commission and Council face a number of challenges setting recreational management measures for summer flounder, scup, black sea bass, and bluefish, including concerns related to uncertainty and variability in the recreational fishery data, the need to change measures (sometimes annually) based on those data, as well as the perception that measures are not reflective of current stock status. In addition, management measures have not always had their intended effect on overall harvest.

The purpose of this document is to consider a management approach called a harvest control rule to establish a process for setting recreational bag, size, and season limits for summer flounder, scup, black sea bass, and bluefish that aims to prevent overfishing, is reflective of stock status, appropriately accounts for uncertainty in the recreational data, takes into consideration angler preferences, and provides an appropriate level of stability and predictability in changes from year to year. The management options aim to rely less on expected fishery performance and instead uses a more holistic approach with greater emphasis on stock status indicators and trends.

Addendum XXXII established an interim management approach for summer flounder and black sea bass that addressed several key management objectives and served as a foundation for broad-based, long-term management reform. The Policy Board and Council are addressing ongoing management challenges and objectives via comprehensive, long-term management reforms over the next several years starting with this document. Those actions will draw upon improved recreational fishery data,[1] updated stock assessments, and innovative management tools.

2.2 Background

For all four species, recreational ACLs are set jointly by the species management board and the Council. ACLs account for landings and dead discards. An RHL for each species is set equal to the ACL minus expected dead discards. Recreational measures (i.e., bag, size, and season limits)

[1] MRIP is an evolving program with ongoing improvements to its methods. Several recent advancements including the transition from a telephone survey to a mail survey to estimate fishing effort have resulted in revisions to the recreational catch and harvest estimates.

are set with the goal of preventing RHL overages. In preventing RHL overages, these measures also aim to prevent ACL overages and overfishing.

The ACLs and RHLs are revised when new stock assessment information becomes available. They are based on stock assessment projections, considerations related to scientific uncertainty, and commercial/recreational allocations. The RHLs incorporate assumptions about dead discards and can be further reduced to account for management uncertainty.

The methods used to determine which measures will prevent RHL overages are not specified in the FMPs and may be modified based on annual recommendations from the Council's Monitoring Committees and the Commission's Technical Committees. MRIP harvest data from one or more recent years are typically used to predict the impacts of changes in bag, size, or season limits on harvest when setting recreational measures. This process typically relies on the assumption that if the recreational measures remain unchanged, next year's harvest will be similar to harvest in the current year or a recent multi-year average. If unchanged measures are expected to result in harvest notably above or below the RHL, then the measures are adjusted to achieve a desired percent liberalization or reduction in harvest based on an analysis of trends shown in recent years' MRIP data.

To allow for consideration of preliminary, current year MRIP data, the Commission's species management board and Council typically determine the overall approach for the upcoming year's recreational measures (e.g., status quo or an overall percentage liberalization or reduction) in December of the current year. They also agree to the federal waters measures in December with the approach for developing state waters measures typically approved by the board in February of the following year.

Of these four species, those that tend to harvest close to or more than their RHL (primarily summer flounder and black sea bass) have required frequent changes to the recreational bag, size, and season limits to prevent future RHL overages. In some cases, the required changes in measures appear to have responded to variability and uncertainty in the MRIP data rather than a clear conservation need. This challenge has been referred to as "chasing the RHL." In addition, many recreational stakeholders expressed frustration that the black sea bass measures did not seem reflective of stock status as they have generally been more restrictive in recent years compared to when the stock was under a rebuilding plan, despite the stock currently being more than double the target level and highly available to anglers.

The bluefish stock was declared overfished in 2019, triggering the development of a rebuilding plan and a need for more restrictive management measures than had previously been in place. The Draft Addenda includes special considerations for stocks in a rebuilding plan. The options in this document are not meant to replace the bluefish rebuilding measures. Any measures implemented for bluefish must comply with the rebuilding plan.

2.3 Status of the Stocks

2.3.1 Summer Flounder

The most recent summer flounder management track stock assessment was completed in June 2021, using data through 2019 (NEFSC 2021a). The Council and Commission FMP for summer flounder defines the management unit as all summer flounder from the southern border of North Carolina to the United States-Canada border. The assessment approach is a complex statistical catch-at-age model incorporating a broad array of fishery and survey data. Results from the 2021 assessment indicate that the summer flounder stock was not overfished, but was 14% below the biomass target, and overfishing was not occurring, in 2019 (Figure 1). Fishing mortality was 20% below the threshold level defining overfishing. More detail on the assessment can be found here.

The 2021 management track stock assessment provided the basis for setting fishery specifications for 2022–2023.

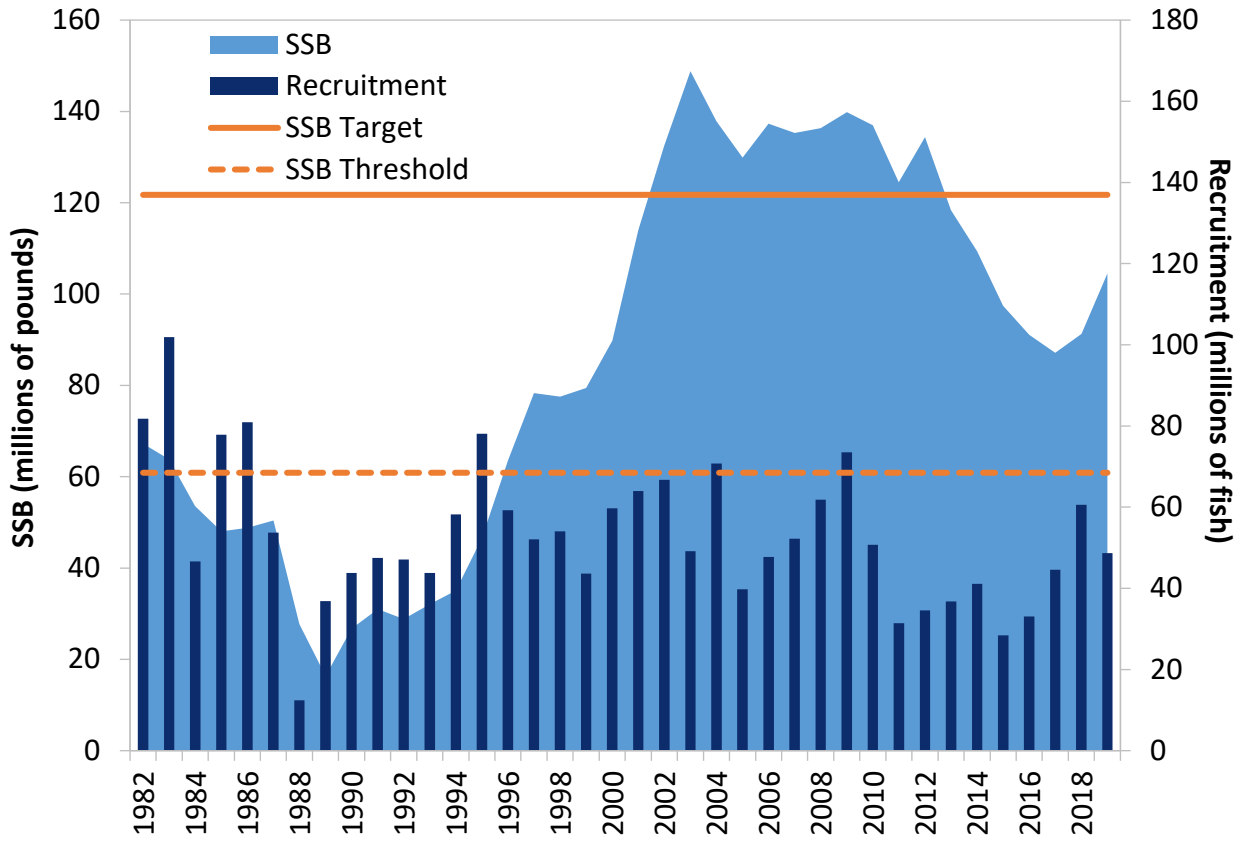


Figure 1. Summer flounder spawning stock biomass and recruitment. Source: 2021 Operational Assessment Prepublication Report, Northeast Fisheries Science Center.

2.3.2 Scup

The most recent scup management track stock assessment was completed in June 2021, using data through 2019 (NEFSC 2021b). The Council and Commission FMP for scup defines the management unit as all scup from Cape Hatteras, North Carolina to the United States-Canada border. The assessment approach is a complex statistical catch-at-age model incorporating a broad array of fishery and survey data. Results from the 2021 assessment indicate that the scup stock was not overfished and was about two times the biomass target, and overfishing was not occurring, in 2019 (Figure 2). Fishing mortality was 32% below the threshold level defining overfishing. More detail on the assessment can be found here.

The 2021 management track stock assessment provided the basis for setting fishery specifications for 2022–2023.

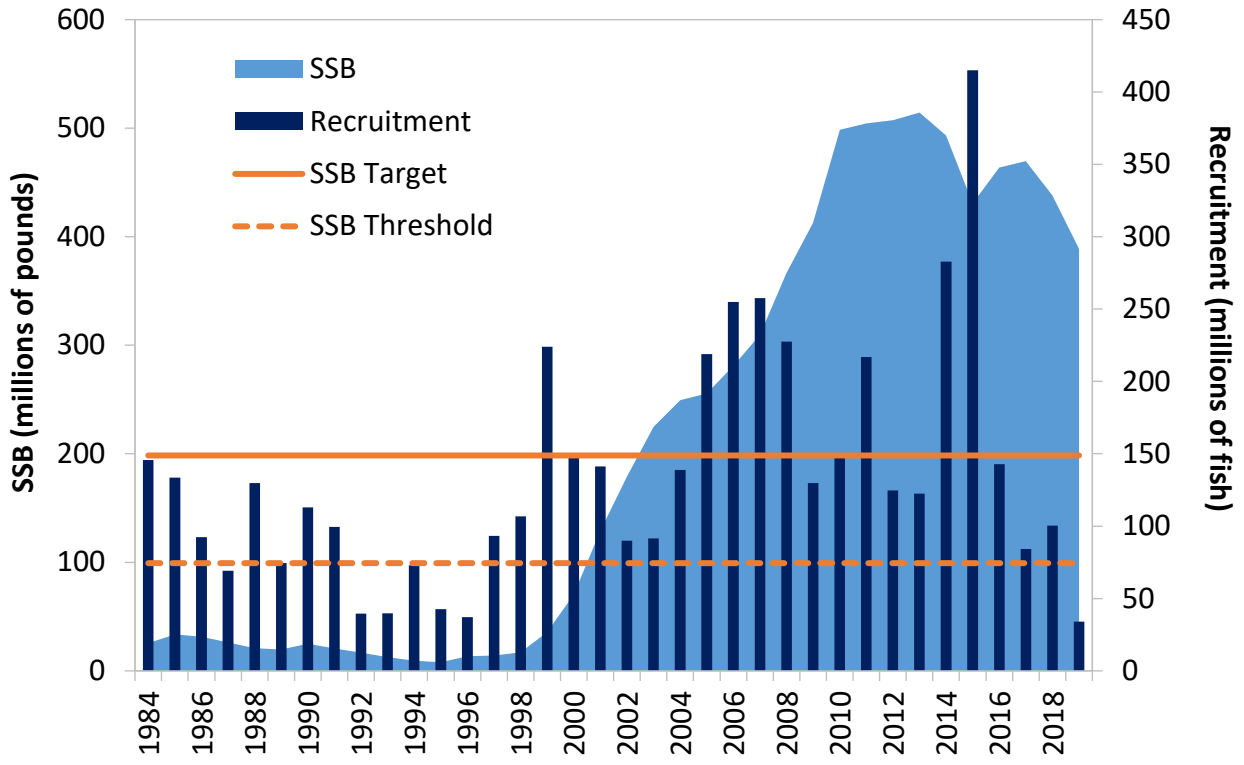


Figure 2. Scup spawning stock biomass and recruitment. Source: 2021 Operational Assessment Prepublication Report, Northeast Fisheries Science Center.

2.3.3 Black Sea Bass

The most recent black sea bass stock assessment update was completed in July 2021, using data through 2019 (NEFSC 2021c). The Council and Commission FMP for black sea bass defines the management unit as all black sea bass from Cape Hatteras, North Carolina to the United States-Canada border. The assessment modeled black sea bass as two separate sub-units (North and South) divided approximately at Hudson Canyon, from which results were combined for the entire stock's status determination. The assessment used a combined-sex, age-structured assessment model. Results from the 2021 assessment indicate that the black sea bass stock was not overfished and was about 2.2 times the target level, nor was overfishing occurring in 2019 (Figure 3). Fishing mortality was 15% below the threshold level defining overfishing. The assessment required an adjustment to account for the significant retrospective pattern. This adjustment was only applied to the terminal year of the assessment and the adjusted values are used for management. Of the four species considered in this action, only black sea bass required a retrospective adjustment in the assessment. More detail can be found here.

The 2021 management track stock assessment provided the basis for setting fishery specifications for 2022–2023.

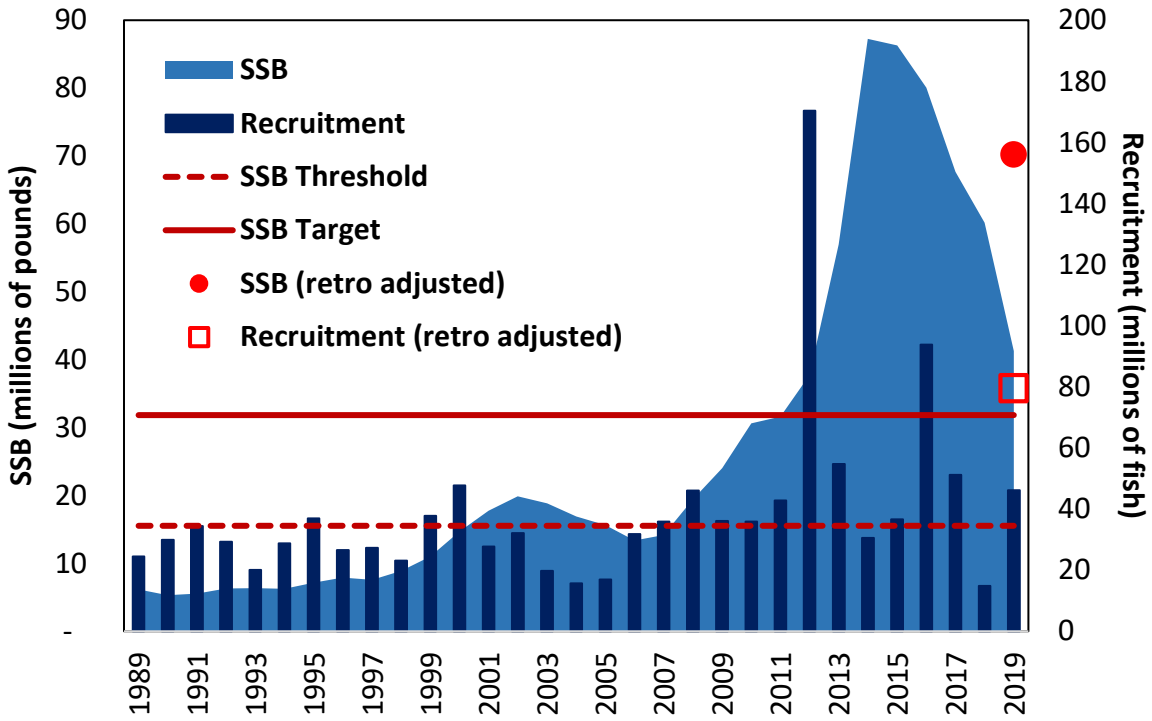


Figure 3. Black sea bass spawning stock biomass and recruitment with retrospective adjusted values. Source: 2021 Operational Assessment Prepublication Report, Northeast Fisheries Science Center.

2.3.4 Bluefish

The most recent bluefish management track stock assessment was completed in June 2021, using data through 2019 (NEFSC 2021d). The Council and Commission FMP for bluefish defines the management unit as all bluefish in United States waters of the western Atlantic Ocean. The assessment approach is a complex statistical catch-at-age model incorporating a broad array of fishery and survey data. Results from the 2021 assessment indicate that the bluefish stock was overfished and was 5% below the overfished threshold, but overfishing was not occurring in 2019 (Figure 4). Fishing mortality was 5% below the threshold level defining overfishing. More detail on the assessment can be found here.

The 2021 management track stock assessment along with the preferred rebuilding plan selected jointly by the Board and Council at their June 2021 meeting provided the basis for setting fishery specifications for 2022–2023.

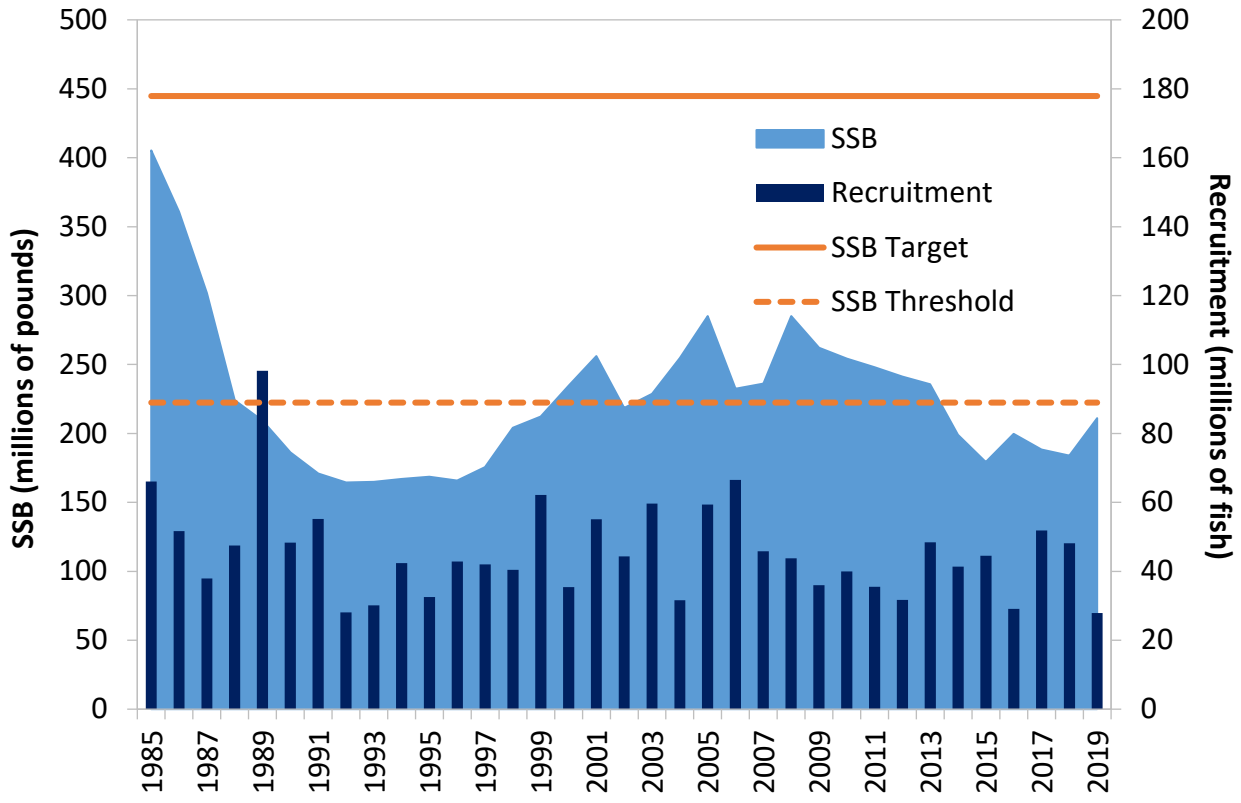


Figure 4. Bluefish spawning stock biomass and recruitment. Source: 2021 Operational Assessment Prepublication Report, Northeast Fisheries Science Center.

2.4 Status of the Fishery

2.4.1 Summer Flounder

Recreational harvest peaked in 1983 at 36.74 million pounds, and declined to a time series low of 5.66 million pounds in 1989. A more recent review of recreational fishery performance from 2011 to present reveals an average of 12.59 million pounds with a high of 19.41 million pounds in 2013 and a low of 7.60 million pounds in 2018. Recreational harvest in 2020 was 10.06 million pounds, a 29% increase from the prior year's harvest of 7.80 million pounds. The total recreational catch (harvest plus live and dead releases) of summer flounder in 2020 was 33.32 million fish, slightly lower than the time series average of 34.46 million fish. The assumed discard mortality rate in the recreational fishery is 10%. In 2020, an estimated 80% of the harvest (in numbers of fish) originated from private/rental boats, while shore-based anglers and party/charter boats accounted for an average of 18% and 2% of the harvest, respectively. In addition, 61% of summer flounder harvested by recreational fishermen (in numbers of fish) were caught in state waters and about 39% in federal waters.

2.4.2 Scup

Most recreational scup catches are taken in states of Massachusetts through New York. From 2011 to 2020, recreational harvest has ranged from 8.27 million pounds in 2012 to 14.12 million pounds in 2019. In 2020, recreational harvest was 12.91 million pounds. The total catch (harvest plus releases) of scup in 2020 were 27.27 million fish, slightly higher than the ten year average of 27.07 million fish. The assumed discard mortality rate in the recreational fishery is 15%. In 2020, an estimated 62% of the harvest (in numbers of fish) originated from private/rental boats, while shore-based anglers and party/charter boats accounted for an average of 28% and 10% of the harvest, respectively. In addition, 90% of scup harvested by recreational fishermen (in numbers of fish) were caught in state waters and about 10% in federal waters.

2.4.3 Black Sea Bass

After a drastic peak in 1986 at 11.19 million pounds, recreational harvest averaged 5.02 million pounds annually from 1987 to 1997. Recreational harvest limits were put in place in 1998 and harvest generally increased from 1.92 million pounds in 1998 to 9.06 million pounds in 2015. In 2016 and 2017 harvest jumped up to 12.05 and 11.48 million pounds, respectively; however the 2016 and 2017 estimates are regarded as implausibly high outliers by the Technical Committee. In 2020, recreational harvest was estimated at 9.12 million pounds with recreational live discards from Maine to Virginia estimated to be 29.79 million fish. Assuming 15% hook and release mortality, estimated recreational dead discards are 4.47 million fish, equal to 51% of the total recreational removals (harvest plus dead discards).

2.4.4 Bluefish

From 2011-2020, recreational catch (harvest plus fish caught and released) of bluefish in U.S. waters of the Atlantic coast averaged 44.46 million fish annually. In 2020, recreational catch was estimated at 30.68 million fish. In 2020, recreational anglers harvested an estimated 9.34

million fish weighing 13.58 million pounds (6,160 metric tons). Harvest during 2018-2020 was exceptionally low compared to the ten year average of 25.69 million lbs. The 2020 average weight of landed fish is 1.45 pounds, which is also lower than the ten year average of 1.65 pounds. This lower average weight is due to the regional distribution of state landings in 2020. The majority of the recreational harvest (pounds) came from Florida (42%), North Carolina (16%), New Jersey (13%), and New York (11%). Fish from southern states (NC-FL) made up 59% of the landings and are typically smaller on average than fish caught in northern states (ME-VA). In 2020, recreational dead releases (15% of released alive fish) were estimated at 3.20 million fish.

3.0 Proposed Management Program

The Policy Board and Council are considering changes to the process of setting recreational management measures for summer flounder, scup, black sea bass, and bluefish. These management changes are considered through the management programs of the Commission and the Council. The Council is bound by the requirements of the Magnuson-Stevens Fishery Conservation and Management Act (MSA), including requirements for ACLs, accountability measures, and prevention of overfishing. NOAA Fisheries, which has final approval authority for Council management documents, will not approve measures that are inconsistent with the MSA. NOAA Fisheries provides guidance throughout development of Council actions to ensure that the preferred options selected for implementation are consistent with the MSA and other applicable laws.

As proposed, the same options would be selected for all four species. It is not intended that one harvest control rule option would be used for some species and a different option for others. However, depending on considerations, such as ongoing development of statistical models to predict recreational harvest, the Policy Board and Council may consider approving different implementation dates by species for any change to the FMPs. All harvest control rule approaches involve various combinations of input metrics (data inputs), flexibilities, and accountability measures with the goal of standardizing management measure setting and providing stability to these recreational fisheries. A table for comparison across all options can be found in Appendix 1.

Stocks under an approved rebuilding plan are subject to the measures of that rebuilding plan, which may differ from the measures under the options below. None of the options in this document are meant to replace rebuilding plan measures. In some instances, measures implemented through the options below may be used as temporary measures until a rebuilding plan is implemented, which can take up to two years after the stock is declared overfished.

3.1 Management Options to Set Recreational Management Measures

Option A. No Action (Current Recreational Measures Setting Process)

Section 2.2 describes the process used in recent years to set recreational measures. The details of this process are not defined in the FMPs and can be modified without an addendum or other change to the FMPs. The following sections summarize the language currently in the Commission's FMPs regarding recreational measures for each species. Under the no action option, these sections of the FMPs could remain unchanged.[2]

1. Summer Flounder

As outlined in section 3.1 of Addendum XXXII, management measures are set annually through a specification process. The process involves the following steps:

- At the joint meeting with the Council typically in December, the Board and Council will decide whether to specify coastwide measures to achieve the coastwide RHL or conservation equivalent management measures using guidelines agreed upon by both management authorities. If the latter, the Board will then be responsible for establishing recreational measures to constrain harvest to the RHL.
- The Technical Committee (TC) will continue to evaluate harvest estimates as they are released, and project how suites of possession limits, size limits and seasons might impact recreational landings in each region. In recommending adjustments to measures (reductions, liberalizations or no change), the TC will examine several factors and suggest a set of regional regulations, which when combined, would not exceed the RHL. These factors could include but are not limited to stock status, resource availability (based on survey and assessment data), and fishery performance (harvest, discards, effort, estimate uncertainty, inter-annual variability), as well as the standards and guiding principles set forth below. The Board will use information provided by the TC to approve a methodology for the states to use in developing regional proposals, typically at the Commission's Winter Meeting.
- The states will collaborate to develop regional proposals for the current year's recreational measures that include possession limits, size limits and season length pursuant to the Board-approved methodology. These proposals will be reviewed by the TC to ensure the data and analysis are technically sound.

[2] Under the no action option, predicted harvest under any combination of measures could continue to rely on the methods described above, or alternative methods could be used if deemed appropriate. For example, the Council and Commission are supporting the development of statistical models for predicting harvest based on management measures and other factors. These models could be used under the no action option.

- The Board will review state proposals, TC recommendations, and establish final measures at a Summer Flounder, Scup, and Black Sea Bass Board meeting following the release of wave 6 MRIP estimates from the previous year.
- Once the Board has approved the measures and the states have promulgated them, the Commission will send a letter to the Regional Administrator certifying the Board approved measures, in combination, will achieve but not exceed the RHL.

The Board also uses a set of standards and guiding principles to structure the development of measures during specification setting (Addendum XXXII Section 3.1.1).

2. Scup

Addendum XI provides the ability for the Board and Council to establish management measures annually through a specification process. The process involves the following steps:

- At the joint meeting with the Council typically in December, the Board and Council will determine whether to maintain status quo measures or a liberalization or reduction in measures are needed to achieve the coastwide RHL.
- States will then proceed to develop proposals, typically the states MA-NY, but other states could have adjustments, for the upcoming year's recreational measures that include possession limits, size limits and season length. These proposals will be reviewed by the TC to ensure the data and analysis are technically sound.
- The Board will review state proposals, TC recommendations, and establish final measures at the Commission's winter meeting.

3. Black Sea Bass

As outlined in section 3.2 of Addendum XXXII, management measures are set annually through a specification process. The process involves the following steps:

- At the joint meeting with the Council typically in December, the Board and Council will decide whether to adopt coastwide measures or if the states will implement measures to constrain harvest to the RHL. If the latter, the Board will then be responsible for establishing recreational measures to be implemented in state waters to constrain harvest to the RHL.
- The TC will continue to evaluate harvest estimates as they are released, and project how suites of possession limits, size limits and seasons might impact

recreational landings in each region. In recommending adjustments to measures (reductions, liberalizations or no change), the TC will examine several factors and suggest a set of regulations for regions, which when combined, would not exceed the RHL. These factors can include but are not limited to stock status, resource availability (based on survey and assessment data), and fishery performance (harvest, discards, effort, estimate uncertainty, inter-annual variability), as well as the standards and guiding principles set forth below. The Board will use information provided by the TC to approve a methodology for the states to use in developing regional proposals, typically at the Commission's Winter Meeting.

- The states will collaborate to develop regional proposals for the current year's recreational measures that include possession limits, size limits and season length pursuant to the Board-approved methodology. These proposals will be reviewed by the TC to ensure the data and analysis are technically sound

- The Board will review state proposals, TC recommendations, and establish final measures at a Summer Flounder, Scup, and Black Sea Bass Board meeting following the release of wave 6 MRIP estimates from the previous year.

- Once the Board has approved the measures and the states have promulgated them, the Commission will send a letter to the Regional Administrator certifying the Board approved measures in combination will achieve but not exceed the RHL.

The Board also uses a set of standards and guiding principles to structure the development of measures during specification setting (Addendum XXXII Section 3.2.1).

4. Bluefish

As outlined in section 5.1.4.1.3 of Amendment 1, management measures are set annually through a specifications process. The process typically involves the following steps:

- At the joint meeting with the Council typically in December, the Board will determine whether to maintain status quo coastwide measures or a liberalization or reduction in measures are needed to achieve the coastwide RHL.

- In order to achieve the annual RHL, recreational fisheries will be constrained by a coastwide regime of coastwide size limits, bag limits, and seasons. Once a basic regime for these limits is established, typically at the joint meeting

with the Council in December, states will be given the opportunity to vary these measures in accordance with the Commission's Conservation Equivalency process[3].

- A state may submit a proposal for a change to its regulatory program to the Commission. Such changes shall be submitted to the ASMFC staff, which will distribute the proposal to the Management Board, the Plan Review Team, the Technical Committee, the Stock Assessment Subcommittee, and the Advisory Panel.
- States must submit proposals at least two weeks prior to a planned meeting of the Technical Committee.
- The ASMFC staff is responsible for gathering the comments of the Technical Committee, the Stock Assessment Subcommittee, and the Advisory Panel and presenting these comments to the Management Board at the Commission's winter meeting.
- The Management Board will decide whether to approve the state proposal for an option management program if it determines that it is consistent with the harvest target and the goals and objectives of the FMP.

5. Current Accountability Measures for Summer Flounder, Scup, Black Sea Bass, and Bluefish

The MSA requires Council FMPs to contain provisions for ACLs and "measures to ensure accountability." The National Standards Guidelines state that accountability measures (AMs) "are management controls to prevent ACLs, including sector-ACLs, from being exceeded, and to correct or mitigate overages of the ACL if they occur. AMs should address and minimize both the frequency and magnitude of overages and correct the problems that caused the overage in as short a time as possible." (50 CFR 600.310 (g)).

The current recreational AMs for these species were implemented through an omnibus amendment in 2013 (Amendment 19 to the Summer Flounder, Scup, and Black Sea Bass FMP and Amendment 4 to the Bluefish FMP). The AMs are included in the Council's FMP. They are not included in the Commission's FMP; however, any changes to the AMs considered through this action will be considered by both the Council and Commission.

Proactive AMs include adjustments to the management measures for the upcoming fishing year (as described in previous sections), if necessary, to prevent the RHL and ACL from being exceeded. Measures to prevent the RHL from being

[3] http://www.asmfc.org/files/pub/ConservationEquivalencyGuidance_2016.pdf

exceeded are ultimately intended to also prevent ACL overages, which in turn prevents overfishing.

Given the timing of MRIP data availability, the regulations do not allow for in-season closure of the recreational fishery if the RHL or ACL is expected to be exceeded. Therefore, measures must be set in a manner that is reasonably expected to constrain harvest to the RHL.

Reactive recreational AMs include a set of possible responses to exceeding the recreational ACL, depending on stock status and which limits are exceeded. Paybacks of ACL overages may be required in a subsequent fishing year, depending on stock status and the scale of the overage, as described below. ACL overages in the summer flounder, scup, and black sea bass recreational fisheries are evaluated by comparing the most recent 3-year average recreational ACL against the most recent 3-year average of recreational catch (i.e., landings and dead discards). If average catch exceeds the average ACL, then the appropriate AM is determined based on the following criteria:

3. If the stock is overfished ($B < ½ B_{MSY}$), under a rebuilding plan, or the stock status is unknown:

The exact amount, in pounds, by which the most recent year's recreational ACL has been exceeded will be deducted in the following fishing year, or as soon as possible once catch data are available.

2. If biomass is above the threshold, but below the target ($½ B_{MSY} < B < B_{MSY}$), and the stock is not under a rebuilding plan:

a. If only the recreational ACL has been exceeded, then adjustments to the recreational management measures (bag, size, and seasonal limits) would be made in the following year, or as soon as possible once catch data are available. These adjustments would take into account the performance of the measures and conditions that precipitated the overage.

b. If the ABC is exceeded in addition to the recreational ACL, then a single year deduction will be made as a payback, scaled based on stock biomass. The calculation for the payback amount is: *(overage amount) * (B_{MSY}-B)/½ B_{MSY}*.

3. If biomass is above the target ($B > B_{MSY}$):

Adjustments to the recreational management measures (bag, size, and seasonal limits) will be made for the following year, or as soon as possible once catch data are available. These adjustments would take into account the performance of the measures and conditions that precipitated the overage.

Reactive recreational AMs for the bluefish recreational fishery are very similar to the process described above with a few key differences. First, ACL overages are evaluated on a 1-year basis as opposed to a 3-year average. Second, if a transfer between the commercial and recreational sectors caused the transferring sector to register an ACL overage, then instead of applying an overage payback to the transferring sector, a transfer in a subsequent year would be reduced by the amount of the ACL overage.

Option B. Percent Change Approach

This option differs from the no action option in that it includes additional consideration of biomass compared to the target level (B/B_{MSY}) when determining if the recreational management measures should be liberalized, restricted, or remain unchanged. The amount of change varies based on the magnitude of the difference between a confidence interval (CI)[4] around an estimate of expected harvest and the average RHL for the upcoming two years, as well as considerations related to biomass compared to the target level (B/B_{MSY}).

Specifically, the first step in determining the overall percent change in harvest would be to compare the average RHL for the upcoming two years to the CI[5] of the most recent two years of MRIP estimates, or to a CI around an alternative predictor of harvest based on a robust statistical methodology approved by the Technical and Monitoring Committees. The MRIP estimates (or approved alternative estimates) are intended as a proxy for expected harvest in the upcoming years under status quo measures, similar to the current process. Depending on whether the average RHL is above the upper bound of the CI, within the CI, or below the lower bound of the CI around the estimate of expected harvest, the management responses are narrowed down to those illustrated in rows A, B, and C in Table 1, respectively.

The second step narrows down the suite of management responses further by taking into consideration the B/B_{MSY} ratio. The third column in Table 1 displays the resulting percent change in measures required for the upcoming two years. A range of sub-options is under consideration for the resulting percent change when the RHL is above or below the bounds of the CI, as described below. Regardless of the sub-options chosen, when the RHL is within the CI, no change in measures would be made if the B/B_{MSY} ratio is between 1 and 1.5 (i.e., the stock is between the target biomass level and 150% of the target level). A 10% liberalization in harvest would be allowed when the B/B_{MSY} ratio exceeds 1.5 (i.e., the stock is greater than 150% of the target biomass level). A 10% reduction in harvest would be required when the B/B_{MSY} ratio is less than 1 (i.e., biomass is below the target level).

[4] A confidence interval provides an upper and lower bound around a point estimate to indicate the range of possible values given the uncertainties around the estimate. For example, a CI of 5% for an estimate of 100 would mean that the value could fall anywhere between 105 and 95. In this option, the CI represents a range of potential harvest estimates that can be reasonably expected to encompass the true harvest value.

[5] Specifically, an 80% joint distribution CI has been suggested as this method takes into consideration the percent standard error (PSE) of each individual years' MRIP estimate and the variability of the estimates between years.

It is important to note that this option considers changes from a starting set of measures. If the current measures have resulted in notable differences between harvest and the RHL in recent years, then they may not be an appropriate starting point under this option and an alternative starting point may be required.

Table 1. Process for determining the appropriate percent change in harvest when developing management measures under the percent change approach.

Row	Future RHL vs Harvest Estimate[6]	B/B_{MSY}[7]	Change in Harvest	
A	Future 2-year avg. RHL greater than upper bound of harvest estimate CI	> 1.5	Sub-Option B-1A: Liberalization percent equivalent to difference between harvest estimate and 2-year avg. RHL	Sub-Option B-1B: 40% Liberalization
		1 – 1.5	Sub-Option B-1A: Liberalization percent equivalent to difference between harvest estimate and 2-year avg. RHL	Sub-Option B-1B: 20% Liberalization
		< 1	Sub-Option B-2A: 10% Liberalization	Sub-Option B-2B: 0%
B	Future 2-YR avg. RHL within CI of harvest estimate	> 1.5	10% Liberalization	
		1-1.5	0%	
		< 1	10% Reduction	
C	Future 2-YR avg. RHL less than lower bound of harvest estimate CI	> 1.5	Sub-Option B-2A: 10% Reduction	Sub-Option B-2B: 0%
		1-1.5	Sub-Option B-1A: Reduction percent equivalent to difference between harvest estimate and 2-year avg. RHL	Sub-Option B-1B: 20% Reduction
		< 1	Sub-Option B-1A: Reduction percent equivalent to difference between harvest estimate and 2-year avg. RHL	Sub-Option B-1B: 40% Reduction

Under this option, the Council and Board would consider adjusting the recreational management measures in sync with the setting of catch and landings limits in response to updated stock assessment information. It is anticipated that updated stock assessments will be available every other year. In interim years, the Council and Board would review the catch and landings limits compared to the measures. They may revise the measures in interim years if new data such as a research track stock assessment or other technical

[6] The two year average MRIP estimate with associated CI is intended as a predictor of future harvest under status quo measures. This may be replaced with statistical model based approaches for predicting harvest.

[7] The proposed B/B_{MSY} inflection points are based on the Council's Risk Policy. Future changes to the Council risk policy may warrant reconsideration of this proposed process.

reports suggest that the measures are not performing as expected or if a change is needed for other reasons. The intent would be to only change the measures in interim years if new information suggests strong concerns with the current measures.

Sub-Options for Percent Change When the RHL is Outside the Bounds of the Expected Harvest Estimate CI

If the Policy Board and Council adopt the percent change approach, they must also select either sub-option B-1A or B-1B. In addition, they must also select either sub-option B-2A or B-2B.

Sub-Option B-1A: Percent Change Capped at Difference Between 2 Year Average RHL and Harvest Estimate

If selected, this sub-option would be used in the following two situations: 1) the average two-year RHL is above the upper bound of the harvest estimate CI (Row A in Table 1) and biomass is at or above the target (B/B_{MSY} is at least 1), or 2) the average two-year RHL is below the lower bound of the harvest estimate CI (Row C in Table 1) and biomass is at or below 150% of the target (B/B_{MSY} is less than or equal to 1.5). Other situations either do not have sub-options (RHL is within the CI; Row B in Table 1) or are covered by sub-options B-2A and B-2B, below.

Under this sub-option, the percent liberalization or reduction in harvest would be defined as the percent difference between the two-year average RHL and a point value harvest estimate. The point value harvest estimate would be either a two-year average of recent MRIP harvest estimates or an alternative estimate based on a robust statistical methodology approved by the Monitoring/Technical Committees. The intent behind this sub-option is to scale liberalizations or reductions proportionately when there are large differences between the harvest estimate and the RHL. For example, if there is a 15% difference between the two-year average RHL and the point value harvest estimate, then the reduction would be 15%. The outcome of this sub-option could be very similar to the no action option (section 3.1.A).

Sub-Option B-1B: 20% or 40% Change (Depending on B/B_{MSY})

Under this sub-option, management measures would aim to achieve the following percentage liberalizations or reductions in overall harvest, as illustrated in Table 1:

- **40% liberalization** when the average two-year RHL is above the upper bound of the harvest estimate CI (Row A in Table 1) and biomass is more than 150% of the target level (B/B_{MSY} greater than 1.5).
- **20% liberalization** when the average two-year RHL is above the upper bound of the harvest estimate CI (Row A in Table 1) and biomass is above the target level but less than 150% of the target level (B/B_{MSY} of 1 – 1.5).
- **20% reduction** when the average two-year RHL is below the lower bound of the harvest estimate CI (Row C in Table 1) and biomass is above the target level but less than 150% of the target level (B/B_{MSY} of 1 – 1.5).

- **40% reduction** when the average two-year RHL is below the lower bound of the harvest estimate CI (Row C in Table 1) and biomass is below the target level (B/B_{MSY} less than 1).

Other situations either do not have sub-options (RHL is within the CI) or are covered by sub-options B-2A and B-2B, below.

The intent of this sub-option is to provide predictable changes in harvest based on the percentage amount applied historically in management.

Sub-Option B-2A: 10% Reduction

Under this sub-option, when the upcoming 2-year average RHL is below the lower bound of the CI around the harvest estimate (i.e., an RHL overage is expected), measures would be modified such that expected harvest is reduced by 10%, regardless of the scale of the expected overage. The rationale behind this alternative is that a reduction is needed to ensure that continued overages do not contribute to overfishing as required by the MSA; however, the assumption is that the reduction need not be greater than 10% per cycle given that biomass is very high compared to the target level. An analysis of potential impacts on stock status under this, as with all other options in this document, has not been performed.

Sub-Option B-2B: No Change in Measures

Under this sub-option, when the upcoming 2 year average RHL is below the lower bound of the CI around the harvest estimate (meaning an RHL overage is expected under status quo measures), no change in the measures would be made, regardless of the scale of the expected overage. The assumption behind this alternative is that reductions are not needed because biomass is very high compared to the target level. However, it should be noted that harvest overages can contribute to overfishing, even at high biomass levels, and, as previously stated, in order to comply with the MSA, any adopted options must prevent overfishing. An analysis of potential impacts on stock status under this, as will all other options in this document, has not been performed.

Accountability Measures under the Percent Change Approach

Background information on AMs is provided in section 3.1 under Option A on page 16. Under the Percent Change Approach, measures would be more restrictive when stock status is poor and more liberal when stock status is good. In addition, when RHL overages are expected (based on the CI comparison described above), measures would be proactively reduced by a predetermined percent when the stock is less than 150% of the target level. Reductions would also be taken if the stock is below the target even when the RHL is within the CI, helping to rebuild the stock back to the target. These aspects of this option could all be considered proactive AMs.

This option requires minimal changes from the current reactive AMs described on page 16. The current reactive AMs would be modified such that when paybacks are required,

the payback could be spread evenly across two years to help facilitate the use of constant measures across two years. When a payback is applied, the percent change would be determined based on the reduced ACL.

Consideration could also be given to options A and B listed in section 3.4. These options consider modifications to the metrics considered when biomass is above the threshold but below the target and a scaled payback of a past overage may be needed.

Option C. Fishery Score Approach

The fishery score is a formulaic method that combines multiple metrics into one value which is used to determine the appropriate management measures. Based on the score, the stock would be placed into one of four bins with corresponding management measures. The fishery score would be based on four metrics: biomass (B) relative to the target (B_{MSY}), recruitment (R), fishing mortality (F), and fishery performance, as described in more detail below and in Appendix 3. Each metric has a weight assigned to it, determined by the Technical/Monitoring Committees such that metrics with a stronger relationship to harvest would have more weight in the fishery score while still accounting for metrics that impact harvest but may not drive harvest. Additional metrics may be added and weighting schemes adjusted as more data become, based on the recommendations of the Monitoring/ Technical Committees.

The fishery score would be calculated using the following formula:

$$\boldsymbol{B/B_{MSY}(W_B) + F/F_{MSY}(W_F) + R\ (W_R) + \text{Fishery performance}\ (W_{FP}) = \text{Fishery Score}}$$

Where W refers to the weight of each factor. The fishery score value corresponds to a predetermined bin. The fishery score would range from 1 to 5 and the bins are defined as displayed in Table 2.

Weights would have a minimum of 0.1 and maximum of 0.5 to prevent any one metric from being weighed too heavily in relation to the others. The intent is to allow the Monitoring/Technical Committees to recommend changes to the weights through the specifications process based on their expert judgement and empirical methods when possible. Changes should be limited to provide stability in comparisons over time.

Table 2. Fishery score bins and the associated level of concern, stock status, and measures that are associated with each bin.

Bin	Fishery Score	Stock Status and Fishery Performance Outlook	Measures
1	4-5	Good	Most Liberal
2	3-3.99	Moderate	Liberal
3	2-2.99	Poor	Restrictive
4	1-1.99	Very Poor	Most Restrictive

A declining fishery score over time could indicate negative trends in stock status and an examination of the individual fishery score metrics can provide insight into why the overall score is declining. This can also serve as an early warning of the need to use more restrictive measures in the future if the trend continues.

Measures associated with each of the four bins would aim to achieve a target level of harvest, catch, or fishing mortality, depending on the option selected from section 3.2. The target would be a point value, but the measures in each bin would be anticipated to produce a range of possible harvest, catch or fishing mortality, given uncertainty and variability in the data. Considerations related to confidence intervals and other statistical metrics and models could be used to determine the appropriate measures for each bin.

Although the fishery score would be calculated based on multiple factors, the management measures associated with each bin could be defined based on four categories of biomass. For example, the most liberal bin (Bin 1, fishery score of 4-5) could have measures based on a target level of harvest, catch, or fishing mortality (depending on the option selected from section 3.2) which is appropriate for biomass that is double the target level. The next most liberal bin (Bin 2, fishery score of 3-3.99) could have measures that are appropriate for biomass at 125% of the target. The next lowest bin (Bin 3, fishery score of 2-2.99) could have measures that are appropriate for biomass at 75% of the target level. The most restrictive bin (Bin 4, fishery score less than 2) could have measures that are appropriate for biomass at 25% of the target level (however; if the stock is under a rebuilding plan, the most restrictive fishery score measures may be temporary until replaced by rebuilding plan measures).

While the measures associated with each bin would be based on biomass compared to the target, placement of a year's measures within one of the four bins would be driven by multiple factors. For example, if the recruitment and fishery performance metrics have low scores, then the stock may be placed in a more restrictive bin with more restrictive

measures than would occur based on biomass considerations alone. The opposite could occur if multiple metrics have high scores. In this way, the measures would be reflective of a combination of biomass relative to the target and assumed future conditions (e.g., high recruitment assumed to result in higher biomass in the future, allowing for more liberal measures).

Under this option, the Council and Board would consider adjusting the recreational management measures in sync with the setting of catch and landings limits in response to updated assessment information. It is anticipated that updated stock assessments will be available every other year. In interim years, the Council and Board would review the catch and landings limits and the measures. As part of this review, the fishery score could be re-calculated with updated fishery performance data; however, updated estimates for the other fishery score metrics would not be available. The Council and Board may revise the measures in interim years if new data, such as a research track assessment or other technical reports, suggest that the measures are not performing as expected or if a change is needed for other reasons. The intent would be to only change the measures in interim years if new information suggests strong concerns with the current measures.

Sub-Options for Accountability Measures under the Fishery Score Approach

Background information on AMs is provided in section 3.1 on page 16. For both sub-options in this section, measures are set based on a variety of factors such that they are more restrictive when stock status is poor and more liberal when stock status is healthy. In addition, as described above, this method can provide an early warning of deteriorating stock conditions which can inform the setting of measures. The measures for all bins will be regularly reviewed to ensure that they remain appropriate and prevent overfishing. These aspects of this approach can be considered proactive AMs.

Sub-Option C-1: Reactive AMs Similar to Current AMs

As under this sub-option, ACL overages would be evaluated by comparing the most recent 3-year average recreational ACL against the most recent 3-year average of recreational catch (i.e., landings and dead discards). If average catch exceeds the average ACL, then the appropriate AM is determined based on the following criteria:

1. If the stock is overfished ($B < ½ B_{MSY}$), under a rebuilding plan, or the stock status is unknown:

    a. The stock is placed in the most restrictive bin. These may be temporary measures until replaced by measures required by a rebuilding plan, which can take up to two years to implement.

    b. If the stock was already in the most restrictive bin or the measures in the most restrictive bin are otherwise expected to continue to result in overages, then those measures must be modified as soon as possible following the

determination of the overage such that they are reasonably expected to prevent future overages.

2. If biomass is above the threshold, but below the target (½ B_{MSY} < B < B_{MSY}), and the stock is not under a rebuilding plan:

a. If only the recreational ACL has been exceeded, then the stock would remain in its current bin, but the measures associated with that bin and all other bins, will be re-evaluated with the goal of preventing future ACL overages.

b. If the ABC or F_{MSY} (as determined through section 3.4) is exceeded in addition to the recreational ACL, and the stock has not already moved to a more restrictive bin due to a decrease in the fishery score, then the measures associated with the next more restrictive bin would be implemented. In addition, measures in all bins would be re-evaluated and revised as appropriate. If the stock moves to a more restrictive bin based on a decrease in the fishery score, then an additional AM is not needed as the negative impacts on stock status have already been accounted for in the movement to the more restrictive bin.

3. If biomass is above the target (B > B_{MSY}):

The management measures associated with each bin will be adjusted, taking into account the performance of the measures and the conditions that precipitated the overage.

Sub-Option C-2: Reactive AMs Based on Overfishing Status to Evaluate Measures

If overfishing is occurring (F is greater than F_{MSY}), even if a change in bin was not triggered through re-calculation of the fishery score as described above, the management measures for all bins will be re-evaluated and modified as needed to appropriately constrain recreational catch and end overfishing.

Option D. Biological Reference Point Approach

Under this option, the primary metrics of terminal year B/B_{MSY} and F/F_{MSY} from the most recent stock assessment would be used to guide selection of management measures. Management measures would be grouped into seven bins, as illustrated in Table 3. Each bin would have a set of default measures which would be implemented the first time the stock is placed in that bin.

To define the bins under this option, fishing mortality (F) would be considered in two states: overfishing (F greater than F_{MSY}) or not overfishing (F equal to or below F_{MSY}). B/B_{MSY} would be further divided to provide more responsive levels of access based on the following:

- Biomass is greater than or equal to 150% of the target.
- Biomass is greater than or equal to the target but less than 150% of the target.

- Biomass is less than the target, but greater than or equal to the threshold (the threshold is ½ the target).
- Biomass is less than the threshold (the stock is overfished).

Recruitment and trends in biomass are secondary metrics under this option which are used to fine tune default measures only when stock conditions (F/F_{MSY} and B/B_{MSY}) relative to the categories above have not changed between the prior and most recent assessments. In this case, biomass trend and a recruitment metric, describe in Appendix 3, can be used to further relax, restrict, or re-evaluate measures. As such, biomass trends and recruitment would impact the management measures, but to a lesser extent than F/F_{MSY} and B/B_{MSY}.

Changes to the measures would be considered based on the following process when updated stock assessment information is available (anticipated to be every other year). The first time a stock is in a new bin, the fishery would be subject to the default measures. If the bin remains unchanged after a subsequent stock assessment update, then recruitment and biomass trend would be considered to determine if measures remain unchanged or if limited liberalizations or reductions can be permitted. As described below, liberalizations within a bin are only allowed in Bins 1 and 2, which are associated with a healthy stock status. Restrictions and/or re-evaluation within a bin can be required based on secondary metrics for Bins 3-6. This allows for relative stability if stock status is unchanged, but also room for tuning of measures if warranted based on biomass trend and/or recruitment. It is intended that the changes within a bin would be based on predetermined guidelines. However, the Council and Board may revise the measures in interim years if new data, such as a research track assessment or other technical reports, suggest that the measures are not performing as expected or if a change is needed for other reasons. The intent would be to only change the measures in interim years if new information suggests strong concerns with the current measures.

Liberalizations within a bin are not permitted when biomass is below the target level or when F exceeds F_{MSY}. For example, if a stock in Bin 2 (F below F_{MSY} and biomass above B_{MSY}, but below 150% of B_{MSY}) remains in Bin 2 based on an updated stock assessment, then measures may be liberalized to preset measures if recruitment and/or biomass trends show positive signs (see Appendix 3). If either of those metrics shown negative signs, then measures would stay status quo. If the updated stock assessment information indicates biomass exceeds 150% of B_{MSY}, then the stock would move into Bin 1, triggering a new set of default measures more liberal than those from Bin 2. Alternatively, if biomass is below the target, then the stock would move to a more restrictive bin (Bins 3-6).

Stocks in Bin 3 are not subject to overfishing and are not overfished but are below their target biomass level. Stocks in Bins 4-6 are experiencing overfishing. The goal of the management measures in Bins 3-6 is to improve stock status by ending overfishing and/or increasing biomass. If the initial default measures do not accomplish this, but the primary metrics of F/F_{MSY} and B/B_{MSY} do not change, then secondary measures can inform how to better adjust regulations to reach the target through additional restrictions. This differs

from stocks in Bins 1-2, where measures would not be adjusted in this circumstance. Additionally, when a stock is in Bins 4-6 (F exceeds F_{MSY}) and the current measures produce catch or harvest that exceed the ACL or RHL (e.g., based on a multi-year average), then the default measures should be re-evaluated.

Any overfished stock (biomass below ½ B/B_{MSY}) would automatically fall into Bin 7 until an approved rebuilding plan is implemented. Stocks under a rebuilding plan must comply with the requirements of the rebuilding plan, and the rebuilding plan measures may differ from the pre-defined measures in this option.

Measures for Bins 1-7 would aim to achieve a target level of harvest, catch, or fishing mortality, depending on the option selected from section 3.2. Although placement in Bins 1-7 would be based on a combination of biomass and fishing mortality, the recreational management measures associated with each bin could be defined based on six categories of biomass and the target level of harvest, catch, or fishing mortality deemed appropriate for that biomass level. The following biomass levels are provided as examples which may be further refined. These examples were constructed such that more risk is allowed when stock status is good compared to when stock status is poor.

- **Bin 1** (biomass greater than or equal to 150% of the target and F below F_{MSY}): default measures are based on biomass that is double the target level.
- **Bin 2** (biomass above the target level but less than 150% of the target and F below F_{MSY}): default measures based on biomass that is 140% of the target level.
- **Bin 3** (biomass between the target and threshold and F below F_{MSY}): default measures based on biomass that is 75% of the target level.
- **Bin 4** (biomass greater than or equal to 150% of the target and F above F_{MSY}): default measures based on a biomass that is at the target level.
- **Bin 5** (biomass above the target level but less than 150% of the target and F above F_{MSY}): default measures based on biomass that is at the target level.
- **Bin 6** (biomass between the target and threshold and F above F_{MSY}): default measures based on biomass that is 60% of the target level.
- **Bin 7** (biomass below the threshold): default measures based on biomass that is 25% of the target level, until replaced by rebuilding plan measures.

The measures in each bin would be anticipated to produce a range of possible harvest, catch, or fishing mortality, given uncertainty and variability in the data. Considerations related to confidence intervals and other statistical metrics and models could be used to define the measures associated with each bin. Measures within each bin would take into consideration small changes to allow for liberalizations or reduction to allow for the flexibility to fine tune measures based on both recruitment and biomass trends in addition to the current biomass and fishing mortality levels.

Table 3. Summary of the biological reference point option illustrating bins of measures associated with different combinations of stock conditions. B stands for biomass, F for fishing mortality rate and R for recruitment.

	F ≤ Fmsy	F > Fmsy
B >= 150% Btarget	R↑ R↓ B↑ liberal liberal B↓ default default **1**	R↑ R↓ MRIP ≤ RHL/ACL B↑ default restrictive B↓ restrictive restrictive MRIP > RHL/ACL B↑ B↓ restrictive & re-evaluate measures **4**
Btarget ≤ B < 150% Btarget	R↑ R↓ B↑ liberal liberal B↓ default default **2**	R↑ R↓ MRIP ≤ RHL/ACL B↑ default restrictive B↓ restrictive restrictive MRIP > RHL/ACL B↑ B↓ restrictive & re-evaluate measures **5**
Bthreshold ≤ B < Btarget	R↑ R↓ B↑ default restrictive B↓ restrictive restrictive **3**	R↑ R↓ MRIP ≤ RHL/ACL B↑ default restrictive B↓ restrictive restrictive MRIP > RHL/ACL B↑ B↓ restrictive & re-evaluate measures **6**
B < Bthreshold	**MOST RESTRICTIVE/REBUILDING PLAN** **7**	

Accountability Measures under the Biological Reference Point Approach

Background information on AMs is provided in section 3.1 on page 16. Under the Biological Reference Point approach, measures are set based on a variety of factors such that they are more restrictive when stock status is poor and more liberal when stock status is healthy. Each bin has two sets of measures: a default set and either a more liberal or more restrictive set of measures. The measures for all bins will be regularly reviewed to ensure that they remain appropriate and prevent overfishing. These aspects of this approach can be considered proactive AMs.

The Biological Reference Point option is unique in that it includes reactive AMs built into the bins to respond to declining stock status (i.e., more restrictive measures implemented when biomass is below the target or F exceeds F_{MSY} and biomass trend and/or recruitment show negative signs or recreational overages have occurred; Bins 3-6). Therefore, no additional reactive AMs are needed under this approach.

Option E. Biomass Based Matrix Approach

This option would define six bins of recreational measures based on two factors: biomass compared to the target level (B/B_{MSY}) and the most recent trend in biomass. Bin 1 represents the optimal conditions, while Bin 6 represents the worst conditions.

Definitions:

- Abundant = Stock is at least 150% of the target level (B_{MSY})
- Healthy = Stock is above the target, but less than 150% of the target
- Below Target = Stock is below the target, but above the threshold (the threshold is half of the target and defines an overfished condition)
- Overfished = The stock is below the threshold
- Biomass trend would be defined as stable, increasing, or decreasing based on the methods described in Appendix 3.

When biomass exceeds 150% of the target level, regardless of the biomass trend, Bin 1 measures are selected. This is aimed at providing an opportunity to keep recreational management measures aligned with stock status, which in this case, is significantly above the target. When a stock is fished at F_{MSY} it is expected that stock size will decrease towards the biomass target unless above average recruitment events occur. Thus, it is not necessarily a negative sign if the stock at such high biomass levels experiences a declining trend.

Measures associated with each of the six bins would aim to achieve a target level of harvest, catch, or fishing mortality, depending on the option selected from section 3.2. The measures in each bin would be anticipated to produce a range of possible harvest, catch, or fishing mortality, given uncertainty and variability in the data. Considerations related to confidence intervals and other statistical metrics and models could be used to define the measures associated with each bin.

Although placement in Bins 1-6 would be based on a combination of B/B_{MSY} and biomass trend, the management measures associated with each bin could be defined based on six categories of biomass and the target level of harvest, catch, or fishing mortality deemed appropriate for that biomass level. The following biomass levels are provided as examples which may be further refined. These examples were constructed such that more risk is allowed when stock status is good compared to when stock status is poor.

- **Bin 1** (biomass greater than or equal to 150% of target level or biomass above target but less than 150% of target with increasing trend): measures are based on biomass that is 150% of the target level.
- **Bin 2** (biomass above the target level but less than 150% of the target with stable or decreasing trend): measures based on biomass that is at the target level.

- **Bin 3** (biomass between the target and threshold and increasing trend): measures based on biomass that is 75% of the target level.
- **Bin 4** (biomass between the target and threshold and stable or decreasing trend): measures based on biomass that is 60% of the target level.
- **Bin 5** (biomass below the threshold and increasing trend): measures based on biomass that is 40% of the target level.
- **Bin 6** (biomass below the threshold and stable or decreasing trend): measures based on biomass that is 20% of the target level.

Table 4. Recreational management measure matrix under the Biomass Based Matrix approach.

Biomass Level	**Biomass Trend**		
	Increasing	**Stable**	**Decreasing**
Abundant At least 150% of target	Bin 1		
Healthy Above target, but less than 150% of target	Bin 1	Bin 2	
Below Target but above threshold	Bin 3	Bin 4	
Overfished Below threshold	Bin 5	Bin 6	

Sub-Options for Accountability Measures Under the Biomass Based Matrix

Background information on AMs is provided in section 3.1 on page 16. For both sub-options below, measures are set based on a variety of factors such that they are more restrictive when stock status is poor and more liberal when stock status is healthy. The measures for all bins will be regularly reviewed to ensure that they remain appropriate and prevent overfishing. These aspects of this approach can be considered proactive AMs.

Sub-Option E-1: Reactive AMs Similar to Current AMs

As under this sub-option, ACL overages would be evaluated by comparing the most recent 3-year average recreational ACL against the most recent 3-year average of recreational catch (i.e., landings and dead discards). If average catch exceeds the average ACL, then the appropriate AM is determined based on the following criteria:

1. If the stock is overfished ($B < ½ B_{MSY}$), under a rebuilding plan, or the stock status is unknown:

a. The most restrictive measures (Bin 6) would be implemented. These may be temporary measures until replaced by measures required by a rebuilding plan, which can take up to two years to implement.

b. If the most restrictive measures were already in place or are otherwise expected to continue to result in overages, then those measures must be modified for the upcoming fishing year such that they are reasonably expected to prevent future overages.

2. If biomass is above the threshold, but below the target ($½ B_{MSY} < B < B_{MSY}$), and the stock is not under a rebuilding plan:

a. If only the recreational ACL has been exceeded, then the stock would remain in its current bin, but the measures associated with that bin and all other bins, will be re-evaluated with the goal of preventing future ACL overages.

b. If the ABC or F_{MSY} (as determined through section 3.4) is exceeded in addition to the recreational ACL, and the stock has not already moved to a more restrictive bin due to a decrease in biomass, then measures associated with the next more restrictive bin would be implemented. In addition, measures in all bins would be re-evaluated and revised as appropriate. If the stock moves to a more restrictive bin based on a decrease in biomass, then an additional AM is not needed as the negative impacts on stock status have already been accounted for in the movement to the more restrictive bin.

3. If biomass is above the target ($B > B_{MSY}$):

The management measures associated with all bins will be adjusted, taking into account the performance of the measures and the conditions that precipitated the overage.

Sub-Option E-2: Reactive AMs with a Trigger Based on Overfishing Status to Evaluate Measures

Under this sub-option, if overfishing is occurring (F is greater than F_{MSY}), even if a change between bins was not triggered through an updated comparison of the Biomass Based Matrix metrics as described above, the management measures for all bins will be re-evaluated and modified as needed to appropriately constrain recreational catch and end overfishing.

3.2 Target Metric for Setting Measures

The options in this section define the target metric which would be used when setting measures appropriate for the set of stock conditions that define the bin under options C-E in section 3.1. The options in section 3.2 do not apply if either options A or B in section 3.1 are selected. While the PDT/FMAT has not come to a consensus on which method was preferable, they did agree that if option C is selected, a secondary option should also be selected if the primary option cannot be calculated for any reason.

Option A. Recreational Harvest Limit

Under this option, the measures associated with each bin in options C-E under section 3.1 would aim to achieve but not exceed a target level of harvest which is informed by the RHL. Options C-E in section 3.1 use a binned approach to setting recreational management measures, with each bin representing a range of stock conditions. For this reason, the target level of harvest for each bin may not always be equivalent to the RHL under the no action alternative as a range of RHLs could fall under the same bin.

The RHL is calculated by removing projected dead discards from the Recreational ACL. Both the RHL and ACL are based on stock assessment projections, considerations related to scientific uncertainty, and commercial/recreational allocations. The RHLs can also be adjusted to account for management uncertainty.

Option B. Annual Catch Limit

Under this option, the measures associated with each bin in options C-E under section 3.1 would aim to achieve but not exceed a target level of dead catch (i.e., harvest and dead discards) which is informed by the recreational ACL. Options C-E in section 3.1 use a binned approach to setting recreational management measures, with each bin representing a range of stock conditions. For this reason, the target level of catch for each bin may not always be equivalent to the recreational ACL under the no action alternative as a range of ACLs could fall under the same bin.

The ACL is based on stock assessment projections, considerations related to scientific uncertainty, and commercial/recreational allocations.

Option C. Recreational Fishing Mortality Target

Under this option, the measures associated with each bin in options C-E under section 3.1 would aim to achieve but not exceed a target level of fishing mortality (F) for the recreational fishery. It remains to be determined how a recreational fishing mortality target would be calculated. The stock assessments for each species calculate a fishing mortality reference point (F_{MSY}) for the commercial and recreational fisheries combined. Overfishing occurs at the stock level when fishing mortality exceeds this reference point. There are no fishing mortality reference points specific to the recreational fisheries. Furthermore, although the current stock assessment models for summer flounder, scup,

and bluefish generate estimates of recreational fishing mortality, the current stock assessment model for black sea bass does not model the recreational fishery separately from the commercial fishery. Therefore, unless the model structure changes, it would not be possible to generate a fishing mortality estimate for black sea bass to compare against a recreational fishing mortality target. For these reasons, if this sub-option is selected as preferred by the Policy Board and Council, a secondarily preferred sub-option may also be selected for use in the event that a recreational fishery F target or F estimate cannot be generated.

3.3 Conservation Equivalency Options

The options in this section consider how the Commission's conservation equivalency policy would apply to the management options listed under section 3.1. The options in this section may only be considered if a harvest control rule management option other than Option A (No Action) in section 3.1 is selected.

Option A. No Action (States Retain Ability to Propose Conservation Equivalent Measures)

This option maintains the ability for states to submit proposals for alternative recreational management measures that are expected to achieve an equivalent level of recreational harvest, catch, or F (as determined by the sub-options in section 3.2). If a state submits a proposal outside of an implementation plan process, it must provide the proposal two months in advance of the next Board meeting to allow committees sufficient time to review the proposal and to allow states to respond to any requests for additional data or analyses. Further details describing the process and procedures can be found in the Commission's conservation equivalency policy noted above.

Option B. Regional Conservation Equivalency

This option allows for regions, as defined by the pre-determined species regions in Appendix 4, to submit proposals for alternative recreational management measures which are expected to achieve an equivalent level of recreational harvest, catch, or fishing mortality (depending on the option chosen from section 3.2) as the pre-defined measures of the bin. If a region is submitting a proposal, it must provide the proposal two months in advance of the next Board meeting to allow committees sufficient time to review the proposal and to allow the regions to respond to any requests for additional data or analyses.

Option C. Conservation Equivalency is Disallowed

Under this option, conservation equivalency under the Commission process will not be permitted for any of the four species on a state or regional level. This would reduce the flexibility afforded to states/regions compared to the previous two options, but would help achieve the goals of stability and predictability in measures. Several of the options

proposed in this document have mechanisms in place to allow for the revision of management measures at different bins if they are not working as intended.

3.4 Accountability Measures Comparisons

The options in this section consider a change to one component of the reactive AMs under options A, B, C-1, and E-1 in section 3.1. Specifically, they address situations when a reactive AM has been triggered and biomass is above the threshold but below the target level. All other components of the AMs are summarized along with options A-E in section 3.1. These changes are only considered for the recreational AMs. No changes to the commercial AMs are considered through this action. Regardless of option chosen, AMs should be regularly revaluated following the provisions of the MSA.

Option A. Catch compared to the ABC

Under this sub-option, when a reactive AM has been triggered by a recreational ACL overage and the most recent biomass estimate is between the target and the threshold, catch relative to the ABC would also be considered. The response to the overage would be stricter if the ABC was also exceeded (e.g., a payback would be required or the stock would be placed in a more restrictive bin, depending on the option). If only the recreational ACL was exceeded, the response to the overage would be less strict (e.g., measures would be revised but a payback would not be required or the stock would remain in its current bin, depending on the option).

Option B. Fishing mortality compared to an F threshold

This sub-option maintains ACL evaluations within the AMs, but rather than considering if the ABC was also exceeded (see previous section), consideration would be given to if the fishing mortality threshold (F_{MSY}) was also exceeded. The intent behind this option is that it considers if total fishery removals negatively impacted the stock based on the most recent information. For example, catch in a past year may have exceeded the recreational ACL, but a subsequent stock assessment update may indicate that the stock did not suffer notable negative impacts if the fishing mortality threshold was not exceeded. The most recent fishing mortality estimate considers more recent information than the information used to set a previous year's ACL. To set the ACL and ABC, projections must be made that make assumptions about how the fishery may perform. This approach using a fishing mortality comparison would look at data that represents what transpired in the fishery or stock during the time being evaluated, according to the most recent stock assessment. If regularly updated estimates of total fishing mortality compared to the threshold are not available, then this comparison would default to the ABC comparison described above.

4.0 Compliance

TBD

5.0 Literature Cited

NEFSC. 2021a. Summer Flounder Management Track Assessment Report.

NEFSC. 2021b. Scup Management Track Assessment for 2021. Prepublication copies prepared for use by Fishery Management Council staff and SSC. Available at https://www.mafmc.org/ssc-meetings/2021/july21-23.

NEFSC. 2021c. Black Sea Bass Management Track Assessment for 2021. Prepublication copies prepared for use by Fishery Management Council staff and SSC. Available at https://www.mafmc.org/ssc-meetings/2021/july21-23.

NEFSC. 2021d. Atlantic Bluefish Management Track Assessment for 2021. Prepublication copies prepared for use by Fishery Management Council staff and SSC. Available at https://www.mafmc.org/ssc-meetings/2021/july21-23.

4.0 APPENDICES

Appendix 1. Comparison of Options and Current Stock Status

The following table summarizes metrics considered when setting recreational measures under each option in this Draft Addenda/Framework. Primary metrics determine in the appropriate bin (see section 3.1 for more details); secondary metrics are only used if, through the evaluation of the primary metrics, the stock stays in the current bin. Metrics considered through accountability measures may differ from those shown below. See section 3.1 for more details on the options.

Option	Metrics used to set measures					Measures are pre-determined	Expected number of sets pre-determined measures	Measures specified for 1 or 2 years
	Expected harvest*	Biomass compared to target level (B/B_{MSY})	Fishing mortality compared to threshold level (F/F_{MSY})	Recent recruitment	Biomass trend			
No action	Primary					No	N/A	1
Percent change	Primary	Primary				No	N/A	2
Fishery score	Primary**	Primary**	Primary**	Primary**		Yes	4	2
Biological reference point	Only when $F>F_{MSY}$	Primary	Primary	Secondary	Secondary	Yes	13	2
Biomass based matrix		Primary			Primary	Yes	6	2

*Expected harvest refers to expected harvest under status quo measures compared to the upcoming year(s)' RHL and could be based on past MRIP estimates, including consideration of confidence intervals for those estimates, or a model-based estimate of harvest, including considerations related to uncertainty in that estimate.

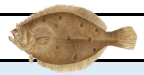
**As described in section 3.1-C, the fishery score metrics may not be weighted evenly. The Monitoring/Technical Committees will recommend the appropriate weight for each metric. These weights can be modified through the specifications process.

Appendix 2. Placement of Each Species in Each Option with Current Data

Option B: Percent Change Approach

As illustrated in the figure below, for summer flounder, the 2022-2023 RHL is within the CI of the 2019-2020 MRIP harvest estimates and the most recent B/B_{MSY} ratio is 0.85. Therefore, a 10% reduction would be needed under the Percent Change Approach.

For black sea bass and scup, the 2022-2023 RHL is below the CI of the 2019-2020 MRIP harvest estimates and the most recent B/B_{MSY} ratio exceeds 1.5. Therefore, depending on sub-option selected, either a 10% reduction would be needed or no change in measures would be made under the Percent Change Approach.

Row	Future RHL vs Harvest Estimate	$B/_{BMSY}$	Change in Harvest	
A	Future 2-year avg. RHL greater than upper bound of harvest estimate CI	> 1.5	Sub-Option B-1A: Liberalization percent equivalent to difference between harvest estimate and 2-year avg. RHL	Sub-Option B-1B: 40% Liberalization
		1 - 1.5	Sub-Option B-1A: Liberalization percent equivalent to difference between harvest estimate and 2-year avg. RHL	Sub-Option B-1B: 20% Liberalization
		< 1	Sub-Option B-2A: 10% Liberalization	Sub-Option B-2B: 0%
B	Future 2-YR avg. RHL within CI of harvest estimate	> 1.5	10% Liberalization	
		1-1.5	0%	
		< 1	 10% Reduction	
C	Future 2-YR avg. RHL less than lower bound of harvest estimate CI	> 1.5	Sub-Option B-2A: 10% Reduction 	Sub-Option B-2B: 0% 
		1-1.5	Sub-Option B-1A: Reduction percent equivalent to difference between harvest estimate and 2-year avg. RHL	Sub-Option B-1B: 20% Reduction
		< 1	Sub-Option B-1A: Reduction percent equivalent to difference between harvest estimate and 2-year avg. RHL	Sub-Option B-1B: 40% Reduction

Option C: Fishery Score Approach

The Monitoring/Technical Committees will recommend the appropriate weight for each metric within the fishery score approach. These weights can be modified through the specifications process. In this example the weighting for each metric was assigned as follows:

B/B_{MSY} = 40% F/F_{MSY} = 20% Recruitment = 20% Fishery Performance = 20%

Summer Flounder

Using the results of the 2021 management track assessment for summer flounder we calculated the current fishery score as follows, assuming the weighting described above:

- B/B_{MSY} = 47,397/55,217 = 0.85 (FS=3)
- F/F_{MSY} = 0.340/0.422 = 0.81 (FS=5)
- Recruitment Percentile: 81-100% (FS=5)
- Landings: 2019-2020 avg. RHL within CI (FS=3)

3(.4) +5(.2) + 5(.2) + 3(.2) = 3.8

Given a fishery score of 3.8, summer would be considered at medium risk with a moderate stock status and the corresponding management measures would be liberal.

Bin	Fishery Score	Stock Status and Fishery Performance Outlook	Measures
1	4-5	Good	Most Liberal
2	3-3.99	Moderate	Liberal
3	2-2.99	Poor	Restrictive
4	1-1.99	Very Poor	Most Restrictive

Scup

Using the results of the 2021 management track assessment for scup we calculated the current fishery score as follows, assuming the weighting described above:

- B/Bmsy=176,404/90,019 = 1.95 (FS=5)
- F/Fmsy = 0.136/0.200 = .68 (FS=5);
- Recruitment Percentile: <20% (FS= 1)
- Landings: 2019-2020 avg. RHL below lower bound of CI (FS=1)

5(.4) +5(.2) + 1(.2) + 1(.2) = 3.4

Given a fishery score of 3.4, scup would be considered at medium risk with a moderate stock status and the corresponding management measures would be liberal.

Bin	Fishery Score	Stock Status and Fishery Performance Outlook	Measures
1	4-5	Good	Most Liberal
2	3-3.99	Moderate	Liberal
3	2-2.99	Poor	Restrictive
4	1-1.99	Very Poor	Most Restrictive

Black Sea Bass

Using the results of the 2021 management track assessment for black sea bass we calculated the current fishery score as follows, assuming the weighting described above:

- B/Bmsy= 30,774/14,441 = 2.1 (FS=5)
- F/Fmsy =.5 (FS=5)
- Recruitment Percentile: 61-80% (FS= 4)
- Landings: 2019-2020 avg. RHL below lower bound of CI (FS=1)

5(.4) +5(.2) + 4(.2) + 1(.2) = 4

Given a fishery score of 4, black sea bass would be considered at low risk with a healthy stock status and the corresponding management measures would be the most liberal.

Bin	Fishery Score	Stock Status and Fishery Performance Outlook	Measures
1	4-5	Good	Most Liberal
2	3-3.99	Moderate	Liberal
3	2-2.99	Poor	Restrictive
4	1-1.99	Very Poor	Most Restrictive

Bluefish

Using the results of the 2021 management track assessment for bluefish we calculated the current fishery score as follows, assuming the weighting described above:

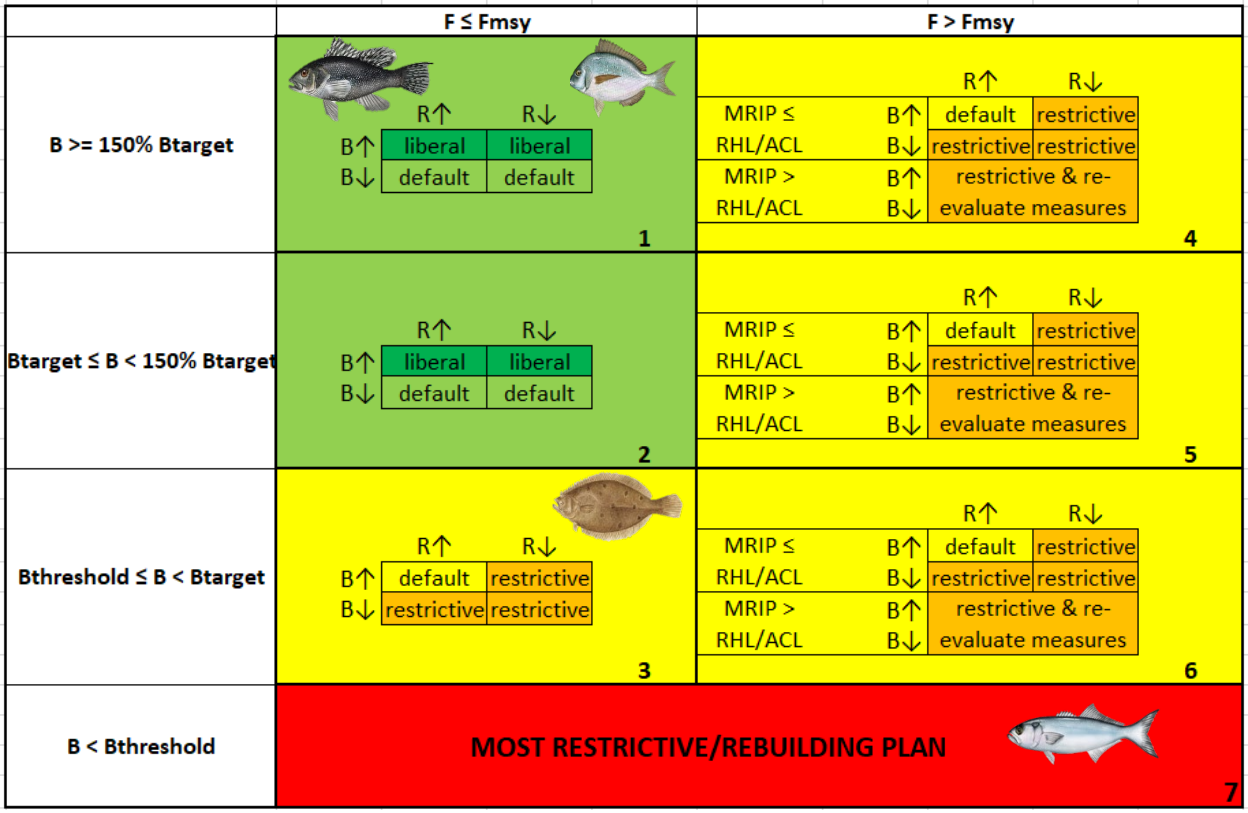
- B/Bmsy= 95,742 /201,729 = 0.47 (FS=1)
- F/Fmsy =.95 (FS=3)
- Recruitment Percentile: 41-60% (FS= 3)
- Landings: 2019-2020 avg. RHL below lower bound of CI (FS=1)

1(.4) +3(.2) + 3(.2) + 1(.2) = 1.8

Given a fishery score of 1.8, bluefish would be considered at the highest risk with a very poor stock status and the corresponding management measures would be the most restrictive.

Bin	Fishery Score	Stock Status and Fishery Performance Outlook	Measures
1	4-5	Good	Most Liberal
2	3-3.99	Moderate	Liberal
3	2-2.99	Poor	Restrictive
4	1-1.99	Very Poor	Most Restrictive

Option D: Biological Reference Point Approach

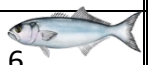


As illustrated in the figure above, under the Biological Reference Point option, each stock under consideration is shown in the respective bin based on the most recent stock assessment results (summarized under the fishery score alternative)

- Both scup and black sea bass would be in Bin 1, with the default measures. If the 2023 stock assessment update indicates that both recruitment and biomass have increasing trends with no change to biomass or fishing mortality, then measures would be liberalized.
- For summer flounder, the stock is placed in Bin 3. This bin indicates a low biomass without overfishing occurring, and measures would be the default measures of this bin. If in the 2023 stock assessment, biomass and fishing mortality show stable trends but either recruitment or biomass showed a decline, measures would be restricted. If biomass improves, then the stock will move from Bin 3 to Bin 2 – as long as overfishing isn't occurring.
- For bluefish, the stock is under a rebuilding plan and defaults to Bin 7. The stock will remain here until the Board/Council determine if can once again enter into the harvest control rule.

Option E: Biomass Based Matrix Approach

According to the most recent stock assessment information, both scup and black sea bass have biomass levels that are over 150% of the target with a decreasing biomass trend. This places them in Bin 1 under the Biomass Based Matrix Option. Summer flounder has a biomass below the target and an increasing biomass trend. Therefore, the stock is in Bin 3. Bluefish is in Bin 6 because it is in a rebuilding plan.

Stock Status	Biomass Trend		
	Increasing	Stable	Decreasing
Abundant At least 150% of target	Bin 1 		
Healthy Above target, but less than 150% of target	Bin 1	Bin 2	
Below Target but above threshold	Bin 3 	Bin 4	
Overfished Below threshold	Bin 5	Bin 6 	

Appendix 3. Determining Metrics for Each Option

Please note that the methodology for determining metrics for each option could be revised pending further PDT/FMAT and Board/Council discussion. These changes would only affect the calculation of metrics under each option, and would not impact the management framework for using the harvest control rule approaches.

Confidence Intervals for MRIP Comparison

For options that incorporate comparison of harvest to recent MRIP estimates, the FMAT/PDT recommends using an 80% confidence interval (CI) around the most recent two years of MRIP harvest estimates. An 80% CI balances concerns related to certainty (higher CI %) and precaution when reductions might be needed or economic opportunity when liberalizations could be allowed (lower CI %). As described in section 3.1, the intent of this CI is to serve as a proxy for expected future harvest under status quo measures. This proxy could be replaced by an alternative estimate and associated CI generated from a robust statistical methodology approved by the Monitoring/Technical Committees.

Option C: Fishery Score Approach

Determining Metric Values for the Fishery Score

The following section provides an example of how the metrics could be used to generate a fishery score value ranging from 1 to 5.

$$B/B_{MSY}(W_B)$$

Biomass from the most recent stock assessment would be given a value of 1-5 based on the following criteria, which are loosely based on other aspects of the management program (e.g., the Council's risk policy).

- 5: Biomass is equal to or greater than 150% of the target
- 4: Biomass is less than 150% of the target, and equal to or greater than the target
- 3: Biomass is below the target, and equal to or greater than 75% of the target
- 2: Biomass is below 75% of the target, and equal to or above the threshold (which is ½ the target and defines an overfished state)
- 1: Biomass is below the threshold

$$F/F_{MSY}(W_F)$$

Fishing mortality could be scored based on whether the most recent fishing mortality estimate is at, above, or below the threshold level. Only three increments were selected for fishing mortality as other aspects of the management program consider only

whether F is at, above, or below the target. This scoring methodology may be revised based on further analysis and additional stock assessment considerations.[8]

- 5: F/F_{MSY} is at least 5% less than 1
- 3: F/F_{MSY} within 5% of 1
- 1: F/F_{MSY} is at least 5% greater than 1

Recruitment(W_R)

To determine the recruitment metric, the most recent three year average estimate of recruitment will be compared to the 20th, 40th, 60th, 80th, and 100th percentiles of the time series of recruitment used in stock projections. This percentile categorization of the relative strength of an incoming year class was deemed more informative than measuring trends in recruitment, especially given the highly variable nature of recruitment from year to year. Assessing where recruitment fell in the percentile distribution was determined a more appropriate measure of recruitment's impact on future levels of biomass.

- 5: 3 year average R in the 81-100 percentile
- 4: 3 year average R in the 61-80 percentile
- 3: 3 year average R in the 41-60 percentile
- 2: 3 year average R in the 21-40 percentile
- 1: 3 year average R is in the 0-20 percentile

Fishery performance (W_{FP})

Fishery performance is evaluated by comparing the confidence interval (CI) defined based on the method described on page 43. The score is determined by where the average RHL appears in relation to the CI.[9] The following three categories are used for this metric:

[8] An alternative scoring method which may be further developed by the FMAT/PDT is to consider the probability that the terminal year fishing mortality estimate (F) from the most recent stock assessment exceeds the threshold level defining overfishing (F_{MSY}). The following four categories are provided as examples.

- 5: 0-24% probability that terminal year F exceeds F_{MSY}
- 4: 25-49% probability that terminal year F exceeds F_{MSY}
- 2: 50-74% probability that terminal year F exceeds F_{MSY}
- 1: 75-100% probability that terminal year F exceeds F_{MSY}

[9] When developing a CI from two years of MRIP data, the PDT/FMAT recommends the use of a joint distribution 80% confidence interval that takes into consideration the PSE of each individual years' MRIP estimate and the variability of the estimates between years. This recommendation is based on an analysis of several years of MRIP

- 5: 2-yr avg. RHL above upper bound of CI
- 3: 2-yr avg. RHL within CI
- 1: 2-yr avg. RHL below lower bound of CI

Option D and E: Biological Reference Point and Biomass Based Matrix

Evaluating B/Bmsy and F/Fmsy

Fishing Mortality (F)

- F ≤ Fmsy - *Fishing mortality is less than or equal to the target.*
- F > Fmsy - *Fishing mortality is greater than the target (overfishing is occurring)*

Biomass (B)

- 150% B_{MSY} target ≤ B - *Biomass is greater than or equal to 1.5x the target*
- B_{MSY} target ≤ B < 150%B_{MSY} target - *Biomass is greater than or equal to the target but less than 1.5x the target*
- B_{MSY} threshold ≤ B < B_{MSY} target - *Biomass is less than the target but greater than or equal to the threshold*
- B < B_{MSY} threshold – *Biomass is less than the threshold (Overfished), a management response (Rebuilding Plan) is required under the MSA. See Accountability Measures for more information.*

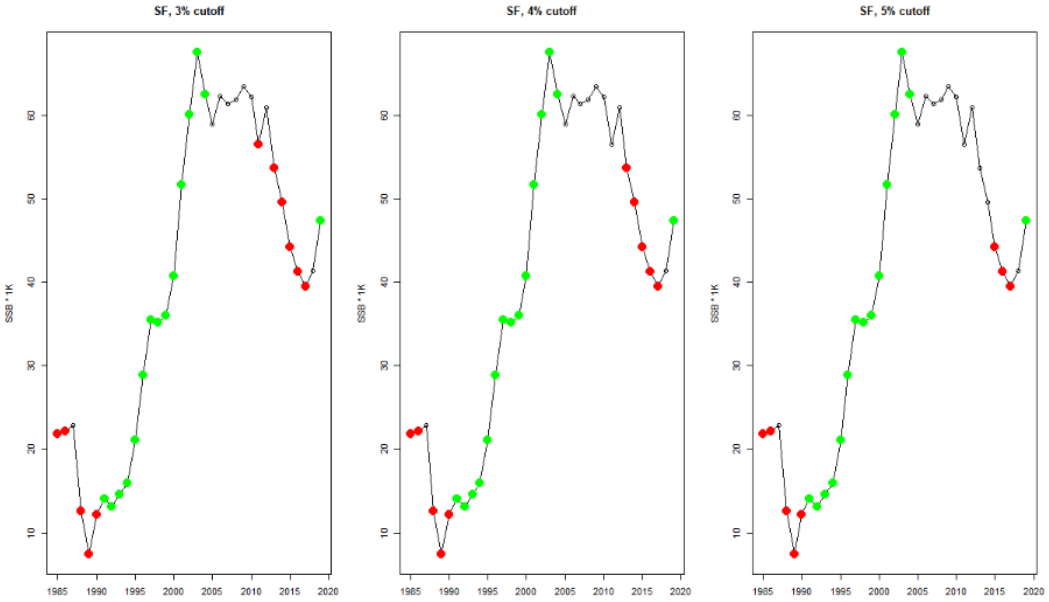
Evaluating Biomass Trends – This Section was revised March 2022

Evaluating biomass trends can be accomplished using a variety of statistical methods. The PDT/FMAT is working on a number of potential options.

One possible approach would use the average percent change in biomass (or spawning stock biomass) from the three most recent years in the assessment. The average percent change would then be compared to a pre-defined breakpoint. In the figure below we have tested three potential breakpoints 3, 4, and 5 percent. For a 3 percent breakpoint a biomass trend would be considered stable if the percent change was between -3 percent and 3 percent change; considered increasing if the percent change was greater than 3 percent; and, decreasing if the percent change was greater than -3 percent. The number of years in the average, and the breakpoint selected will influence the resulting trend. For the purposes of the biological reference point approach (option D), which only has two categories for biomass trend, the stable and increasing biomass trends would both be considered a positive biomass trend and the decreasing biomass trend would be considered a negative biomass trend.

data for each species. The use of MRIP data in this context is intended as a proxy for expected future harvest under status quo measures. This may be replaced with statistical modelling approaches for predicting harvest, with associated CIs, if such approaches are available in the future.

Summer flounder Trend Sensitivity Analysis



An alternative approach to derive a biomass trend would combine survey indices into a biomass index that could be used to determine the trend. The approach was designed to combine multiple indices and generate a single value to use as a catch-multiplier to provide catch advice in plan-B assessment approaches. We could use a similar approach to combine information from multiple indices and get a single quantitative metric to judge biomass trends. The following steps would be followed: 1) Create an average biomass index from one or more surveys; 2) apply a LOESS smooth to average; 3) fit log linear model to the most recent three years of smoothed data; and 4) transform slope back to normal scale to get a value. This approach may also be considered a back-up approach if an analytical model with biomass estimates is unavailable.

Recruitment - This Section was revised March 2022

Recruitment will be evaluated based on the most recent three-year average recruitment estimate compared to the median of the time series of recruitment used in stock projections. "High" recruitment will be considered a three-year average that is equal to or greater than the median and "Low" recruitment will be considered a three-year average that is below the median.

Fishery Performance - This Section was revised March 2022

This secondary metric comes into play only when a stock remains in its current bin for a second specifications cycle and overfishing is occurring ($F > F_{MSY}$). This metric considers whether or not the current measures resulted in catch and/or harvest greater than the specified limit from the previous specifications cycle. Specifically, a two-year average of catch or harvest from the previous specifications cycle will be compared to the two-year average of the ACL or RHL. A CI

around the catch and/or harvest estimates can be considered when evaluating if an overage occurred.

Appendix 4: Regions for Each Stock

Under Addendum XXXII, summer flounder and black sea bass were divided into the following regions:

Summer Flounder: Section 3.1.1

Measures will be developed using a six-region approach, where the regions are defined as: 1) Massachusetts, 2) Rhode Island, 3) Connecticut-New York, 4) New Jersey, 5) Delaware-Virginia, and 6) North Carolina.

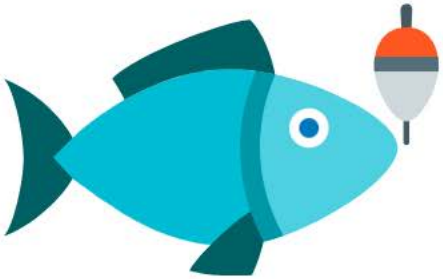
Black Sea Bass: Section 3.2.1

Measures will be developed using a three-region approach, where the regions are defined as Massachusetts through New York; New Jersey; and Delaware through North Carolina (north of Cape Hatteras).

Regions have not been established for management of the recreational scup and bluefish fisheries. The Board and Council can develop regions for these species during final action on this addenda or through a separate action.

Current Process

This is the current process used to set recreational measures for summer flounder, scup, black sea bass and bluefish.



New Harvest Limits are Set

Recreational harvest limits (RHLs) are set based on the most recent stock assessment, considerations about scientific and management uncertainty, commercial & recreational allocations, and assumptions about discards in upcoming years.

Harvest Data Reviewed

Harvest estimates from recent years are used to generate an estimate of expected harvest in the upcoming year under status quo measures.

Determine Changes Needed

If the estimate of expected harvest is similar to the upcoming RHL, then no change in measures is needed. If it is higher or lower than the RHL, then a percentage liberalization or reduction in harvest is agreed upon to allow harvest to meet but not exceed the upcoming RHL.

Set Management Measures

State and federal waters management measures are set based on the agreed upon percentage liberalization or decrease in harvest, or no change.

Percent Change Option

1 → RHL compared to MRIP estimate

Determine if the RHL for the upcoming management period is above, below, or within the confidence interval of the most recent MRIP time-series estimates.

2 → Compare Biomass to target level

Compare the Biomass estimate from the stock assessment to the biomass target level. Biomass categories are as follows:

- 150% above biomass target
- Between 100 and 150% biomass target
- Less than 100% of biomass target

3 → Find percent change in measures

The RHL and Biomass comparison determines the appropriate percent change in harvst needed (if any).

4 → Set Management Measures

Management measures are either liberalized, restricted, or maintained at status quo to acheive the percent change determined through step 3.

Fishery Score Option

STEP 1

Stock Assessment Results

An updated stock assessment is completed and approved for management use.

STEP 2

Calculate Fishery Score Metrics

Fishing mortality, biomass, recruitment, and fishery performance metrics are drawn from the stock assessment and recent MRIP estimates.

STEP 3

Use Formula to Calculate Fishery Score

Fishery Score metrics are entered in the Fishery Score formula to produce a value ranging from 1 to 5. On this scale, 1 is the lowest possible score and 5 is the highest possible score.

STEP 4

Determine Management Step Based on Fishery Score

Based on the calculated Fishery Score, the stock is placed into one of four bins. Each bin has a pre-determined set of management measures (see below)

STEP 5

Determine Management Measures

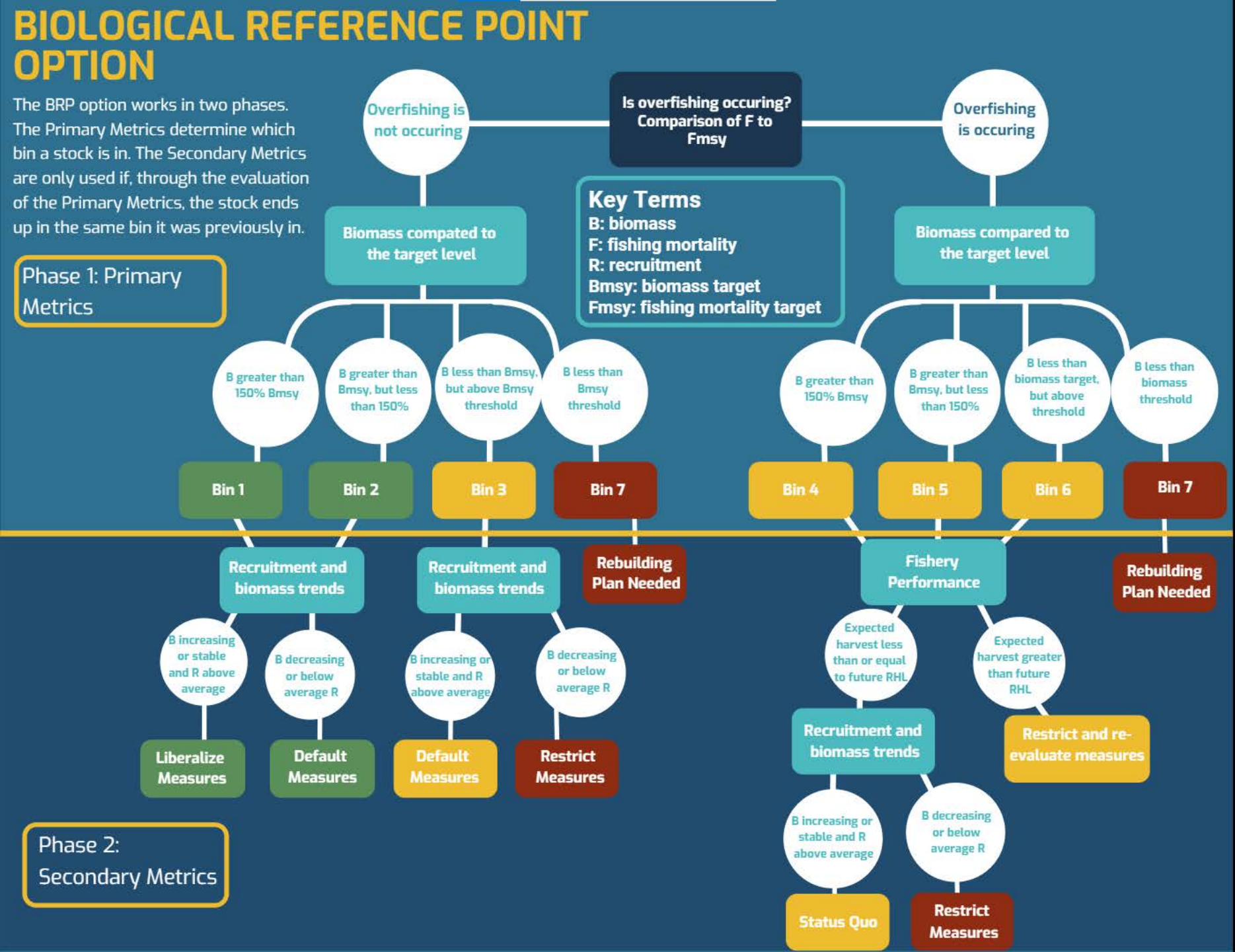
Pre-determined management measures from the relevant bin are implemented.

Fishery Score bins and the associated stock status, fishery performance outlook, and measures that are associated with each bin.

Bin	Fishery Score	Stock Status and Fishery Performance Outlook	Measures
1	4-5	Good	Most Liberal
2	3-3.99	Moderate	Liberal
3	2-2.99	Poor	Restrictive
4	1-1.99	Very Poor	Most Restrictive

BIOLOGICAL REFERENCE POINT OPTION

The BRP option works in two phases. The Primary Metrics determine which bin a stock is in. The Secondary Metrics are only used if, through the evaluation of the Primary Metrics, the stock ends up in the same bin it was previously in.



Biomass Based Matrix Approach

Stock Status is determined

Based on the relationship of biomass to the target level, biomass is categorized as either very high, healthy, below target, or overfished.

Biomass Trend Evaluated

A stock's biomass trend is considered increasing, stable, or decreasing.

Bin Determined

Based on biomass level and biomass trend, stock is placed in one of 6 bins: Bin 1 (optimal conditions) and Bin 6 (worst conditions).

Determine Management Measures

Pre-determined measures from the determined bin are implemented. If the bin is the same as in the prior years, measures remain status quo.

Recreational management measures matrix under the Biomass Based Matrix Approach

Stock Size (i.e., biomass compared to target level)	Trend in stock size		
	Increasing	Stable	Decreasing
Very High: At least 150% of target stock size	Bin 1		
High: Above the target, but below 150% target stock size	Bin 1	Bin 2	
Low: Below the target stock size, but more than 50% of the target stock size	Bin 3	Bin 4	
Overfished (Too Low): Less than 50% of the target stock size	Bin 5	Bin 6	

Atlantic States Marine Fisheries Commission

Business Session

May 5, 2022
11:00 – 11:15 a.m.
Hybrid Meeting

Draft Agenda

The times listed are approximate; the order in which these items will be taken is subject to change; other items may be added as necessary.

1. Welcome/Call to Order *(S. Woodward)*

2. Board Consent
   - Approval of Agenda
   - Approval of Proceedings from January 2022

3. Public Comment

4. Consider Approval of Amendment 7 to the Interstate Fishery Management Plan for Atlantic Striped Bass *(M. Gary)* **Final Action**

5. Consider Noncompliance Recommendations (if necessary)

6. Other Business/Adjourn

The meeting will be held at The Westin Crystal City (1800 Richmond Highway, Arlington, VA; 703.486.1111) and via webinar; click here for details

DRAFT PROCEEDINGS OF THE

ATLANTIC STATES MARINE FISHERIES COMMISSION

BUSINESS SESSION

Webinar
January 27, 2022

These minutes are draft and subject to approval.
The Business Session will review the minutes during its next meeting.

TABLE OF CONTENTS

INDEX OF MOTIONS

ATTENDANCE

Board Members

Pat Keliher, ME (AA)
Cheri Patterson, NH (AA)
Dennis Abbott, NH, proxy for Sen. Watters (LA)
Dan McKiernan, MA (AA)
Raymond Kane, MA (GA)
Jason McNamee, RI (AA)
David Borden, RI (GA)
Eric Reid, RI, proxy for Sen. Sosnowski (LA)
Justin Davis, CT (AA)
Bill Hyatt, CT (GA)
Jim Gilmore, NY (AA)
Emerson Hasbrouck, NY (GA)
Joe Cimino, NJ (AA)
Tom Fote, NJ (GA)
Kris Kuhn, PA, proxy for T. Schaeffer (AA)
Loren Lustig, PA (GA)
Warren Elliott, PA (LA)
John Clark, DE (AA)
Roy Miller, DE (GA)
Craig Pugh, DE, proxy for Rep. Carson (LA)
Russell Dize, MD (GA)
Shanna Madsen, VA, proxy for Sen. Mason (LA)
Chris Batsavage, NC, proxy for K. Rawls (AA)
Jerry Mannen, NC (GA)
Bill Gorham, NC, proxy for Sen. Steinberg (LA)
Mel Bell, SC (AA)
Doug Haymans, GA (AA)
Spud Woodward, GA (GA)
Erika Burgess, FL, proxy for J. McCawley (AA)

(AA = Administrative Appointee; GA = Governor Appointee; LA = Legislative Appointee)

Staff

Robert Beal
Toni Kerns
Laura Leach
Lisa Carty
Kristen Anstead
Tina Berger
James Boyle
Pat Campfield
Maya Drzewicki
Emilie Franke
Lisa Havel
Chris Jacobs
Jeff Kipp
Dustin Colson Leaning
Adam Lee
Kirby Rootes-Murdy
Sarah Murray
Caitlin Starks
Deke Tompkins

Guests

Karen Abrams, NOAA
Max Appelman, NOAA
Mike Armstrong, MA DMF
Pat Augustine, Coram, NY
Alan Bianchi, NC DENR
Heather Corbett, NJ DEP
Jessica Daher, NJ DEP
Laura Deighan, NOAA
Lynn Fegley, MD DNR
Peter Fallon, Maine Stripers
Cynthia Ferrio, NOAA
Anthony Friedrich, SGA
Alexa Galvan, VMRC
Marty Gary, PRFC
Matt Gates, CT DEEP
Saverio Governale, NYS DEC
Hannah Hart, FL FWC
Kristina Harvey, CBF
Jay Hermsen, NOAA
Emily Keiley, NOAA
Wilson Laney
Nils Larson
Kyle Lewis
Tom Lilly
Brooke Lowman, VMRC
Mike Luisi, MD DNR
Chip Lynch, NOAA
Steve Meyers
Mike Millard, US FWS
Wendy Morrison, NOAA
Allison Murphy, NOAA
Brian Neilan, NJ DEP
Adam Nowalsky, Pt. Republic, NJ
Willow Patten, NC DENR
Nicholas Popoff, US FWS
Kathy Rawls, NC (AA)
Lenny Rudow
Tara Scott, NOAA
David Stormer, DE DFW
Nat Thompson, Maine
Mike Waine, ASA
Lowell Whitney, US FWS
Chris Wright, NOAA

These minutes are draft and subject to approval.
The Business Session will review the minutes during its next meeting.

The Business Session of the Atlantic States Marine Fisheries Commission convened via webinar; Thursday, January 27, 2022, and was called to order at 3:00 p.m. by Chair A.G. "Spud" Woodward.

CALL TO ORDER

CHAIR A.G. "SPUD" WOODWARD: I will call to order the Business Session.

APPROVAL OF AGENDA

CHAIR WOODWARD: We have an agenda for the Business Session, any requested modifications to the agenda? If so, signify by raising your hand.

MS. TONI KERNS: No hands raised.

CHAIR WOODWARD: The agenda is accepted.

APPROVAL OF PROCEEDINGS

CHAIR WOODWARD: We also have in the briefing materials the Proceedings from the October 2021 meeting of the Business Session. Are there any suggested edits, or modifications to those proceedings? If so, raise your hand.

MS. KERNS: No hands raised.

CHAIR WOODWARD: All right, we'll consider those accepted by unanimous consent.

PUBLIC COMMENT

CHAIR WOODWARD: We also have public comment opportunity here. I'll open it up for anyone who would like to make public comment.

MS. KERNS: No hands raised.

CHAIR WOODWARD: All right, our next and really only agenda item is consider approval of Amendment 22 to the Interstate Fishery Management Plan for Summer Flounder, Scup, and Black Sea Bass: Commercial/Recreational Allocation**.** For that I am going to call on Dustin, I think he's got some background slides, and then Board Chair Justin Davis will take over after him. Dustin, go ahead.

CONSIDER APPROVAL OF AMENDMENT 22 TO THE INTERSTATE FISHERY MANAGEMENT PLAN FOR SUMMER FLOUNDER, SCUP, AND BLACK SEA BASS: COMMERCIAL/RECREATIONAL ALLOCATION

MR. DUSTIN COLSON LEANING: Yes, thank you, Mr. Chair. I have a very short presentation here today, just really going over the overview of the Amendment. As the Chair said, I'll be covering the Summer Flounder, Scup, and Black Sea Bass Commercial/Recreational Allocation Amendment.

Back in December of 2021, the Summer Flounder, Scup and Black Sea Bass Board and the Mid-Atlantic Fishery Management Council jointly approved preferred alternatives for the Commercial/Recreational Allocation Amendment. If approved by the Commission here today and NOAA Fisheries, this Amendment will be implemented for management for 2023. The effective date would be published in the Federal Register, and so the FMP modifications, or the new Amendment would be consistent with that effective date. We're on track and expect a 2023 implementation. That's just a quick overview of the Amendment. It revises the commercial and recreational allocations for all three species.

It provides the option for future changes to commercial or recreational allocations for all three species, and it provides the option for future changes to commercial or recreational allocations, and annual quota transfers to be made through addenda, or in the Council's instance through frameworks.

This table here up on the screen provides the current allocations on the left, and the revised allocations on the right. For summer flounder, we are going to be moving to a 55 percent allocation to the commercial sector, and a 45 percent allocation to the recreational. For scup it would be a 65

percent share for the commercial sector, and a 35 percent share for the recreational sector.

Then for black sea bass it would be a 45 percent commercial share and a 55 percent recreational share. You'll notice that all these revised sector allocations are catch-based for all three species. Both summer flounder and black sea bass were previously landings-based, and as a reminder, catch equals harvest plus dead discards.

This will allow each sector to be analyzed a little bit more independently when the catch accounting occurs at the end of the year. That is really all I had today. I'll take any questions on the Amendment, and I'm happy to go into greater detail if there are any questions to that effect.

CHAIR WOODWARD: Any questions for Dustin?

MS. KERNS: I have no hands, Mr. Chair.

CHAIR WOODWARD: Justin Davis, I'll call on you.

MR. COLSON LEANING: Maya, if we could bring your screen up now, I think we can put that draft motion on the board.

DR. JUSTIN DAVIS: I would like to take one last opportunity to thank all the people who worked on this Amendment. It was a long multi-year effort so to all the Commission staff, members of the public, Council staff, Agency staff, everybody who contributed to getting this done. Again, one more time thank you, it's good to see this finally coming to completion.

With that said, I'll move on behalf of the Summer Flounder, Scup, and Black Sea Bass Management Board approval of Amendment 22 to the Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan Commercial/Recreational Allocation. The effective date of the Amendment will be consistent with the effective date published in the Final Rule in the Federal Register.

CHAIR WOODWARD: All right, thank you, Justin. I assume this needs a second, even though it is a Board motion? Is that correct?

MS. KERNS: It does not, Spud.

CHAIR WOODWARD: All right, very good, so we do not need a second, because it is a motion made on behalf of the Board. Is there any discussion on the motion?
MS. KERNS: I have Joe Cimino.

CHAIR WOODWARD: All right, go ahead, Joe.

MR. JOE CIMINO: I can't let this go without saying, you know like so many of the allocation discussions we've had, it's always a tough slog. This was certainly one of those. I have no intention of standing in the way of this motion, but I do know that there were a lot of folks that had concerns with how this shook out. I appreciate that, but I think that we all worked very hard to come to the best compromise we could. Thank you.

CHAIR WOODWARD: Thank you, Joe, I appreciate that. Any other discussion, comments on the motion?

MS. KERNS: I have no hands.

CHAIR WOODWARD: Any opposition to the motion?

MS. KERNS: I see no hands.

CHAIR WOODWARD: Any abstentions or nulls out there?

MS. KERNS: No hands. Well, Mr. Chair, Emily Keiley has her hand up, but I just want to make sure, Emily, you know that NOAA doesn't vote on this.

MS. EMILY KEILEY: Sorry, yes putting it down.

MS. KERNS: Okay, just checking. All right, we're good, Mr. Chair.

CHAIR WOODWARD: The motion passes unanimously. Thanks everyone. As Joe said, these allocation actions are always contentious, they have the potential to be very divisive. It is my hope that despite the fact that they are challenging and have a tendency to be polarizing, that we'll continue to do the best we can to address them with civility and collegial perspectives.

You know it takes some time, if everybody is somewhat dissatisfied it's probably the best we could do. We got times ahead of us, but I'm hopeful that we will continue to address them as best we can. Any other business to come before the Business Session?

MS. KERNS: I see no hands.

ADJOURNMENT

CHAIR WOODWARD: All right, then, no other business then we will stand adjourned, and this will conclude our winter meeting of the Commission, thanks everybody. We will continue to be optimistic and hopeful that our May meeting will be in-person. We're certainly going to do everything we can, so everybody go ahead and catch Omicron, get it out of the way. We'll get past this, and hopefully we'll get back to some sort of pre-pandemic normalcy in the future. With that, we'll stand adjourned.

(Whereupon the meeting adjourned at 3:10 p.m. on January 27, 2022.)